The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Strike

THE latest information as we go to press is that the strike is to begin on Friday night. Before that time, however, is reached further negotiations may have brought about a mutual understanding and a settlement. If these hopes are realised everyone will rejoice in the avoidance of a conflict of disastrous dimensions, as the result of which national trade must experience a serious set-back. It is to be hoped, however, that if a settlement is reached, it will have some degree of stability. The public are becoming rather weary of patched-up peaces, which have a precarious life of only a few months. Rather than continue business in these conditions of constant uncertainty, we believe the nation would prefer to have a straight fight to decide whether the country is to be ruled constitutionally by the whole body of citizens or dominated by a comparatively small but actively organised section, obsessed by a narrower class sense than we have ever known, for the most part ignorant of the intricacies and responsibilities of national and especially international trade, and inflated by the most exaggerated notions as to the part they play in the civilised social order. Most of the working population of the country are as sound in morals and in industry as they ever were, but they too often allow fanatical leaders to do in their name what the men themselves often disapprove, while behind all is a body of malevolent opinion and passion frankly out for mischief.

In saying this, we have no sort of sympathy with the oppression of the worker, particularly of the miners, whose work, in its discomforts, physical dangers and national importance, entitles them to good remuneration. But even the miners cannot expect to live on the rest of the community, a large proportion of whom are already worse off than themselves. And, above all, they must recognise that neither themselves nor any other class of workers can benefit by the wilful obstruction and damage of national industry. The charms of revolution might at one time have appealed to the unthinking as a short cut to social luxury, but the example of Russia ought to have dispersed such an illusion, and convinced them that social, like physical, disease cannot be dismissed with a wand, but can only be gradually overcome by slow and patient progress. Bad as the condition of some classes still is, it is immensely better than it was even a quarter of a century ago, and it is madness to sacrifice slow but steady progress for a cataclysm which must largely wreck what has been already secured.

The one principle for which all constitutionalists must stand is that the nation is greater than any class or section. The strength of the Government is that it stands for the nation. The weakness of organised labour—which, after all, is only one section of labour—is that it stands for class—the very evil which it originally arose to overthrow. No purely class domination can hope to endure. The other elements of the nation will inevitably unite, as they have always done, to overthrow every new party of tyranny. A Labour Party, as broad in its outlook and sympathies as the nation itself, and recognising its responsibilities for national well-being, might find a great opportunity at the present juncture. But a Labour Party definitely out to exploit society for its own advantage is certain to meet the ultimate fate of every form of class tyranny.

The Reparations Tax

EXPERIENCE of the working of the German Reparations (Recovery) Act shows how easy it is to impose a tax on the foreigner and how difficult it may be to collect it. The Chemical and Dyestuff Traders' Association has been making inquiries as to the working of the Act, and the testimony of merchants is that the German exporter refuses to deliver goods until he or his agent is paid in full. The general result appears to be either that business with Germany is suspended or

that the duty will have to be paid by the British importer, and in that case passed on to his customer. The opinions of two firms in the chemical and dyestuffs business are worth quoting. One states :—

> The effect of this Act has been to bring our import trade to a standstill. It is clearly the intention of the German manufacturer, in case of business, to add on the 50 per cent. to the price. This means that, in order to get the full price from the British importer he would have to double the price . . . The whole proposal is so badly conceived as to make it extremely difficult to understand how the tax is to be collected.

Another firm writes :—

> Since the Reparations Bill was passed we have found that the attitude taken up by German firms has been that they insist upon the full cash being sent to them before they will part with the goods, which means that trade with Germany will drop out entirely. It seems to us that before anything can really be done some arrangement will have to be come to with the German Government, and a statement issued by them to the effect that they will pay to the German manufacturer the 50 per cent. which the British Treasury intends to withhold. Will it not also be necessary for some arrangement to be come to in regard to the rate of exchange which is to be taken by the British Government and by the German Government ? Until these points are cleared up it does not seem possible to us to arrange any transactions with Germany.

The weakness in the present position is the absence of any effective power to compel Germany to trade with us on the terms of the Reparation Act. Such trade is essential to the recovery of the duty, and if Germany declines to trade on such conditions there is no tax to be recovered. It is clear that we have no direct power of compulsion. The only effective compulsion must arise out of Germany's economic necessity. In other words, can she afford to refuse to trade with us even on the conditions of the Reparations Act ? If she can she will. At present there is no Allied "ring" against her, and it is possible that outside of Great Britain Germany may for a time find a sufficient outlet for her surplus production. On the other hand the loss of British trade would be a serious matter to Germany in her present condition, and the policy of her traders not to deliver goods or surrender documents except against cash in full may be merely "bluff." Such a policy is quite natural as a temporary experiment, designed to induce British importers to trade outside the contemplated processes of the Act. If we consent to pay the tax ourselves in order to obtain delivery of German goods, the German exporter will naturally be well content. If we decline, then we shall see how long he will be able to ignore our markets.

It might have been thought that a punitive Act of this sort would have allowed no trade to be done except on its own conditions, and that precautions would have been taken to ensure that the tax was collected from German and not from British pockets. That, however, is not the case. The Chemical and Dyestuff Traders' Association has taken the opinion of H.M. Commissioner of Customs on the point. Their ruling is that, if he chooses to do so, the British importer can pay for German goods in full in the first instance, provided he accepts liability for the payment of the duty himself. Some confusion has arisen as to how this would work out. First, inquirers were told by the Customs that where the importer paid Germany in full, the duty he would have to pay here was 50 per cent. Just as we go to press, however, we hear that it has been definitely decided that where £100 is paid by an importer direct to Germany, £100 must also be paid by him to the Customs here.

We have no knowledge how far this practice is actually being followed. If, however, it comes into commercial operation two results inevitably follow. The first is that the Act fails in its intention to extract reparation from Germany. The second is that the cost of the goods is increased 100 per cent., and that this cost will certainly be passed on to the British importer's customers, and the consumer, as usual, will pay. It was thought that the Act might compel Germany to make alternative proposals. So far it has not produced this effect, and here again we must await developments. Meantime nobody in this country appears to be benefiting.

Problems of Froth Flotation

In our issue of last week we published a letter (dealing with the froth flotation of coal and ores) from Mr. W. A. Hamor, the Assistant Director of the Mellon Research Institute. Mr. Hamor's letter was prompted by some remarks dealing the flotative reagents which appeared in these columns a few weeks ago. Our correspondent was interested in what we had to say on the matter, and enclosed with his letter some important facts bearing on the problems surrounding the utilisation of fuels which were compiled by himself and his well-known collaborator, Mr. Raymond F. Bacon.

These facts provide some valuable information supplementary to our own remarks on the subject. It is at once apparent that in America there is no doubt about the efficacy of the principle of separating coal by flotation processes. A good deal, so far as success is concerned, appears to hinge upon the method employed in grinding the coal. For instance, if washer-waste is ground in such a way that the grains of coal are subjected to a rubbing or rolling action, the yield of recovered coal is small, and it will contain an excessive amount of ash. On the other hand, if it is crushed in such a manner that the grains are subjected to a minimum of these actions, the recovery will be large and the recovered coal will be relatively free from ash. For the best results it has been found that washery-waste should be *crushed* (not ground) to pass a 48-mesh screen, for the coal particles show the maximum floating properties when they are sharp, angular and lustrous. As a general rule, the larger the percentage recovery the greater will be the ash content of the recovered portion, and if a high percentage efficiency of recovery is desired (*i.e.*, an increase, say, from 70 to 90 per cent.), it is essential materially to increase the agitation of the pulp in the flotation bath, in which case the ash in the concentrate will be increased. With less violent agitation the buoyant action of the air on the coal particles is not great enough to carry them to the surface.

Another factor which affects the ash content of the flotation concentrate is the proportion of pyrites in the material treated. Pyrites floats readily, and therefore the ash in the recovered coal will increase or decrease proportionately with the pyritic content of the original material. It is suggested that this disability might be controlled by preferential flotation. Messrs. Bacon and Hamor express the opinion that, although oil-

flotation may not be an economic process for the recovery of the coal in most low-grade fuels under present conditions, it will undoubtedly play a leading part in meeting prominent fuel problems of the future. The research which has been carried out, therefore, constitutes a valuable reserve of knowledge which will be ready to be turned to account when the coal situation demands that every form of solid waste fuel should be utilised.

Mechanical Condition of Fertilisers

THE address bearing on the condition of the various substances used in agriculture, which Mr. S. H. Collins delivered recently before the members of the Newcastle Chemical Club, serves as a useful reminder of the manner in which the average farmer has learnt to differentiate between the merits of the fertilisers now available. Only some six or seven years ago the farmer paid the price he could afford, bought the material he believed to be the most effective at that price, and left the rest to the producer or middleman. The consumer, in fact, had a certain blind confidence in the supplier, while, as Mr. Collins remarked, manufacturers sometimes imagined that any rubbish was good enough for agriculture. To-day, however, the agriculturist is not so easily imposed upon ; he has advanced with the times, and is usually in a position to judge between good or indifferent properties, whether they be chemical or physical. The effect of his increased powers of discernment have already been illustrated in the case of sulphate of ammonia, more and more of which is now being manufactured by processes (unknown in this country before the war) calculated to produce a high-testing neutral salt in lieu of the low-testing acid material which was universally turned out in the days when competition was less active and the consumer was more credulous.

Chemical requirements have certainly come in for their share of attention recently, but of equivalent importance is mechanical or physical condition. With a salt such as sulphate of ammonia (which is frequently mixed with other fertilisers) dryness and fineness of division, with an ability to scatter freely, are essential, and the elimination of free acid is usually followed by the absence of caking and stickiness. With many other fertilisers, however, uniformity is difficult to obtain, but its importance is emphasised by the fact that in general a small pure crystal dissolves more easily and deliquesces less readily than do coarse impure lumps. Mr. Collins pronounces the use of the grinding mill, with substances such as copper sulphate and mineral phosphates, to be a failure, as particles of all sorts and sizes are obtained by such means. The usual product of milling contains a large proportion of uselessly fine dust, very little sand-like material, and a troublesome if small proportion of coarse particles. He believes, moreover, that the way to greater efficiency lies in placing more dependence on the sieve and less on the grinding mill.

Future of Finsbury College

PROFESSOR G. T. MORGAN, in a plea on behalf of the Finsbury School of Chemistry, refers to the widespread feeling among scientific workers that the closing of the College would be a calamity of national importance. The salving of Finsbury, he points out, cannot be regarded otherwise than as a prudent step in the conservation of our educational resources at a time when public expenditure on new institutes embodying untried schemes is scarcely likely to meet with popular approval. This anticipated continuance of the college involves, however, a retention in its entirety of the unique system of scientific education given at Finsbury, so that the future of this institution may be a logical and evolutionary development of its former activities.

With a high tradition of practical laboratory instruction extending over a period of forty years it is not surprising to find that the senior *alumni* of the Finsbury chemistry department now occupy responsible positions in every centre of chemical activity in the British Empire. It is, moreover, a noteworthy consequence of the close association of the college with the industrial life of the country that several important chemical firms are taking an active interest in the Finsbury defence movement, thus showing in a practical manner their appreciation of the training afforded in this historic school of chemistry.

The Calendar

April		
16	North of England Institute Mining and Mechanical Engineers: General Meeting. Papers by J. Southern and M. Y. Simpson. 2 p.m.	Wood Memorial Hall, Newcastle-upon-Tyne.
18	Chemical Industry Club: Address by Dr. A. Rule on "India." 8 p.m.	2, Whitehall Court, London.
18	Royal Society of Arts: "Recent Applications of the Spectroscope and Spectrophotometer to Science and Industry," by Samuel Judd Lewis. Lecture II. 8 p.m.	John Street, Adelphi, London.
19	Institution of Petroleum Technologists. 5.30 p.m.	John Street, Adelphi, London.
19	The Sheffield Association of Metallurgists and Metallurgical Chemists: "Gas versus Coke in Crucible Steel Making," by F. M. Parkin.	Sheffield.
19	Hull Chemical and Engineering Society: Annual Meeting. 7.30 p.m.	The Metropole, West Street, Hull.
20	Society of Glass Technology: Third Annual Dinner. 7.15 p.m.	Hotel Cecil, Strand, London.
21	Institute of Metals (London Local Section): "Refractories," Dr. W. R. Ormandy.	36, Victoria Street, London.
21	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, London.
22	Royal College of Science Union: Chemical Society: "The Philosophy of Chemistry," by W. L. Scott	Royal College of Science, South Kensington, London.
22	Society of Chemical Industry (Newcastle-on-Tyne Section): Annual General Meeting. Dinner to Sir William J. Pope. 7 p.m.	Newcastle-on-Tyne.
29	Society of Chemical Industry (Liverpool Section): Annual Meeting. Sir William J. Pope will give a paper on "Mustard Gas." 6.15 p.m.	Liverpool.

Books Received

RELATIVITY AND THE ELECTRON THEORY AND GRAVITATION. By E. Cunningham, M.A. Second edition. London: Longmans, Green & Co. Pp. 148. 10s. 6d. net.

New Technological Applications of Old Reactions

Ethyl and Iso-Propyl Alcohols from Hydrocarbons

By "K"

The writer discusses various chemical reactions which have been known for some years, but which have only recently been applied on a commercial scale. In an interesting article he shows how former practical difficulties have gradually been surmounted.

It is universally acknowledged to-day that research in pure science can never be disregarded by the technologist merely because it is immediately inapplicable.

The application of a discovery to industry often comes long after the original basic research has been reported. The reason for this may be one of many. For instance, the changed conditions, which need not be specifically discussed at the moment, that have obtained since large numbers of people have congregated in cities have ultimately led to a break in the natural nitrogen cycle, and have rendered necessary the production of huge quantities of artificial fertilisers by nitrogen fixation processes. Thus, processes depending upon the century-old experiments of Cavendish have been developed in the production of nitric acid from the air, and the observations of many scientists of bygone years have contributed to the successful present-day processes for the synthesis of ammonia.

Again, increasing knowledge in other branches of science often leads to the development of chemical discoveries of the past into present-day industrial processes. The progress of aeronautics, in the direction of dirigibles, demanded the production on a large scale of a gas of high lifting power, but of non-inflammable nature. Helium fulfilled these requirements, and it is, of course, a matter of history that Lockyer in 1868 discovered a new element in the sun, and that, subsequently, Ramsay, Travers and others obtained this new element from terrestrial sources. These investigations, embodying the experimental identification of helium, and the most likely sources of occurrence, laid the foundation for the successful discovery and production of helium in quantities sufficient to be of practical value in the inflation of dirigible airship balloons.

Instances readily occur to the mind, but in this article the manufacture of ethyl and propyl alcohols by methods based upon time-honoured reactions of unsaturated hydrocarbons will be described.

Alcohols from Hydrocarbons

Iso-propyl alcohol is manufactured to-day by the Standard Oil Co. of America, who are working a process developed by Ellis. Propylene is produced, together with other hydrocarbons as a gas mixture, incondensable under the conditions of manufacture of "cracked" gasoline by the pyrogenic decomposition of high boiling hydrocarbons under pressure. The propylene is absorbed by sulphuric acid with the formation of propyl sulphuric acid, which is subsequently decomposed by boiling with water into iso-propyl alcohol. The fundamental reactions were discovered by Faraday nearly a 100 years ago, and more closely investigated by Hennell (*Phil. Trans.*, 1826, page 240; and 1828, page 365). Hennell investigated the action of sulphuric acid upon ethylene or "olefiant gas," but the analogous reaction in the case of propylene was first described by Berthelot, in 1855 (*Jahrsbericht*, 1855, page 611).

Berthelot also confirmed the observations of Hennell as to the absorption of ethylene, which had been challenged by Liebig. In his destructive criticisms of the Theory of Radicals, the latter chemist had to disavow the presence of olefiant gas as a radical in sulphovinic acid, and hence stated that Hennell's gas was contaminated with the vapours of alcohol and ether. The classic experiments of Berthelot, however, demonstrated the correctness of the original observations.

The full synthesis of ethyl alcohol from its elements by a method including the step of absorbing the unsaturated hydrocarbon in sulphuric acid, and hydrolysing the ethyl sulphuric acid produced, is again described by Berthelot in his "Chemie Organique Fondée sur la Synthèse," Paris, 1860. The ethylene was produced by the hydrogenation of acetylene obtained by passing an electric arc between carbon poles, in an atmosphere of hydrogen.

The successful production of ethyl alcohol on a technical scale by the catalytic hydrogenation of acetaldehyde reminds us that the reaction by means of which the latter compound has been produced in quantity has been known for a long time. Lagermark and Eltekow in 1878 found that acetaldehyde was obtained by the absorption of acetylene in strong sulphuric acid, and subsequent distillation with water (Berichte, x., 637). Four years later Kutscherow obtained the aldehyde by the hydration of acetylene in a solution of mercuric bromide (Berichte, xiv., 1540).

Thus, ethyl and iso-propyl alcohols are both manufactured to-day, on a comparatively large scale, by processes which have been developed upon the basis of old and well-known reactions.

Absorption of Olefines in Acid

Before passing to the consideration of the application of these known reactions in present-day processes, the recent investigations of Plant and Sidgwick (J.S.C.I., January 31, 1921, pp. 14-18) upon the absorption of ethylene and propylene in sulphuric acid may be briefly described. The results reported are in agreement with experiences in large scale operations in many respects.

It has been shown, for example, that the absorption of propylene is much more easily effected than that of ethylene. The former combines with sulphuric acid of 80-90 per cent. strength at a temperature of 25°C., at a rate comparable to that at which ethylene is absorbed by 100 per cent. sulphuric acid at a temperature of 70°C. Thus, the observation of Ellis (infra) that the propylene of certain oil gases is absorbed in acid, whilst the ethylene also present is left, is confirmed.

It is also pointed out by Plant and Sidgwick that strong sulphuric acid at a temperature of 100 deg. and more, especially at 125°C., causes decomposition of ethyl sulphuric acid, with charring, although, as is to be expected, the actual rate of absorption of the gas is greatly increased. Here, again, the observations of Bury and Ollander in experiments upon the production of ethyl alcohol from ethylene contained in coke oven gas are confirmed. These investigators work at a temperature of 70°C., preferring to obtain a 70 per cent. utilisation of the ethylene only rather than succeed in "fixing" a greater proportion of the olefine at the expense of difficulties arising from decomposition and charring.

In the case of the absorption of propylene, in addition to the formation of propyl sulphuric acid, a certain amount of polymerisation occurs. In the large scale preparation of iso-propyl alcohol by the Standard Oil Co. (infra), a quantity of insoluble substances is separated from the reaction product before rectification of the iso-propyl alcohol. Similarly, Plant and Sidgwick obtained this insoluble layer, and have examined its properties. This water-insoluble layer consists of a mixture of substances containing no sulphur, but consisting of carbon, hydrogen and oxygen. As reaction with metallic sodium occurs, it is probable that the mixture consists of aliphatic alcohols of high molecular weight, produced from an olefine, which itself has resulted from the polymerisation of propylene. From an examination of the physical constants of the substance, it is concluded that the probable number of carbon atoms in the open chained secondary alcohol is about twelve.

Plant and Sidgwick note several interesting facts relative to the action of sulphuric acid upon the two olefines. Several experiments are recorded showing that the speed of passage of the ethylene has little effect upon the rate of absorption and formation of ethyl sulphuric acid and di-ethyl sulphuric acid, provided a certain small minimum rate has been exceeded.

The purity of the ethylene mixtures has also no pronounced effect upon the rate of reaction after a concentration of about 69 per cent. has been reached. This has, of course, no bearing upon the production of ethyl alcohol on a large scale from the ethylene of coke oven or coal gas, as the amount of the olefine in these industrial gases is relatively small.

The rate of absorption in different concentrations of acid, and at varying temperatures, is recorded graphically, and should be of use in the application of the reaction in manufacturing processes. It is also remarked that ethyl sulphuric acid which is produced by the combination of the two reactants has an auto-catalytic accelerating effect upon the rate of reaction.

Finally, di-ethyl sulphuric acid is also produced, and this incidentally, before all the acid has been converted into ethyl sulphuric acid.

Iso-Propyl Alcohol from Propylene

The Burton process for the production of low boiling hydro-carbons, suitable for use in internal combustion engines, has been operated by the Standard Oil Co., of America, for some years. The starting material, a mixture of high boiling hydrocarbons, is distilled under a pressure of four or five atmospheres, and with a controlled degree of reflux condensation, in specially built "pressure stills." After suitable fractional condensation of the "cracked" products as far as possible, it is found that a considerable amount of incondensable gases must be allowed to escape from the system. These gases, formerly utilised directly for heating purposes, contain about five per cent. of propylene, associated with a smaller amount of ethylene. Other saturated and unsaturated hydrocarbons and hydrogen are, of course, also present.

Ellis has succeeded in applying the Berthelot reaction on a technical scale, so that the Standard Oil Co., who acquired the rights of the process, are now producing two hundred and fifty gallons of iso-propyl alcohol, "Petrohol," per day, from part of the gases coming from their pressure stills.

The basic reactions are represented by the following equations :—

$$CH_3 \cdot CH : CH_2 + H_2SO_4 = CH_3 \cdot CH \cdot HSO_4 \cdot CH_3$$
$$CH_3 \cdot CH \cdot HSO_4 \cdot CH_3 + H_2O = CH_3 \cdot CH \cdot OH \cdot CH_3 + H_2SO_4.$$

Ellis described the application of the above reactions to the members of the New Jersey Chemical Society. There were several problems which required solution before a practicable process was evolved. The gases contain quantities of sulphuretted hydrogen which had to be removed. Sulphuretted hydrogen reacts in some way with propyl sulphuric acid, and the compound, presumably not yet identified, caused trouble in the later stages of the process, especially in the refining of the propyl alcohol.

After the removal of sulphuretted hydrogen in any suitable manner, the mixed gases are passed into sulphuric aicd, of specific gravity 1·8. The absorption of the propylene may be carried out in a continuous or discontinuous manner. In the former, the acid and gas mixture pass in counter current, through a tower, which can be cooled by circulating brine cooled in refrigerating apparatus. The heat of reaction tends to raise the temperature of the acid, but the temperature (for maximum efficiency) is maintained between 10°C. and 20°C.

When a suitable concentration of propyl sulphuric acid is attained, the acid liquor is settled in order to separate oily products, and the brown syrupy liquid is hydrolysed with boiling water. The product is again allowed to settle when insoluble alcohols formed from higher hydrocarbons are removed. The impure aqueous solution of iso-propyl alcohol is now distilled from a leaden still, the distillate from which contains 20 per cent. of iso-propyl alcohol. This dilute solution is rectified in ordinary column stills, and a final distillate consisting of the constant boiling mixture of iso-propyl alcohol and water is obtained.

The dilute sulphuric acid resulting from the process is reconcentrated for use in subsequent operations. The constant boiling mixture of iso-propyl alcohol and water contains 90·3 per cent. by volume of the former and boils at 80·37°C. Its specific gravity is 0·819. The corresponding figures in the case of ethyl alcohol are 97·3 per cent. by volume, 78·15°C., and 0·8065.

Pure iso-propyl alcohol has been obtained, boiling at 82·44°C, and has a specific gravity of 0·7855.

Petrohol, the name under which the constant boiling mixture of iso-propyl alcohol and water is marketed, is a colourless liquid possessing high value as a solvent, and can find many applications as a substitute for ethyl alcohol. Its value on the open market is in the region of 1·75 dollars per gallon.

The vapours of iso-propyl alcohol are less injurious than those of either methyl or ethyl alcohol, but the alcohol, injected intravenously, is more toxic. Iso-propyl alcohol is not suitable for drinking purposes and is not subject to Excise restrictions. For these reasons, together with the fact that the vapours are less injurious to human beings, "petrohol" should find a wide application in industry. Specific uses cannot as yet be detailed, but its high volatility and solvent powers are factors which go well together in many circumstances.

Ethyl Alcohol from Ethylene

The possibility of a partial failure in the supplies of petrol from natural sources has led to many efforts being made to find a satisfactory substitute. One of the most suitable, for power purposes, is ethyl alcohol. The standard method for the production of alcohol is by the fermentation of sugar or of starch, and consequently efforts have been made to discover new abundant sources of sugar or starch containing materials. In addition, however, synthetical processes have been developed.

Ethylene occurs in coke oven and coal gas, and its conversion into alcohol may be effected by a method similar to that described above, in the case of propylene. The conditions under which the absorption of the ethylene in sulphuric acid takes place are slightly different to those employed in the case of propylene. It is for this reason that the ethylene present in the gases from the "cracking" stills is not converted into ethyl alcohol.

In order to effect this, as will appear later, a higher temperature and a higher concentration of acid are required. It was found by Ellis that the unsaturated constituents present in the oil gas were polymerised to a large extent under the above conditions, and difficulties arose, which rendered the use of such strong acid at a high temperature undesirable.

The technical devices which have been employed in the application of the method of Hennell and Berthelot to the production of ethyl alcohol in quantity have been described by De Loisy (*Compt. Rend.*, 1920, 50). It is stated that the reaction of ethylene with sulphuric acid is ordinarily slow, but may be accelerated by certain catalysts. The general economics of the process are considered, special attention being paid to French conditions. It is suggested that an outlet for one half of the dilute sulphuric acid resulting from the hydrolysis of the ethyl sulphuric acid can be found in the production of ammonium sulphate, whilst the rest could be reconcentrated by the utilisation of waste heat and by means of the dry gases emerging from the ethylene absorption towers.

In England, the subject has been surveyed by Bury and Ollander, who described to the members of the Cleveland Institution of Engineers the work which had been carried out at the Skinningrove coke oven plants.

No new principles are, of course, developed, but Bury and Ollander have shown that the ethylene contained in coke oven and coal gas can be converted into ethyl alcohol on a practical scale. Moreover, the gas remaining after the abstraction of the ethylene has a calorific value only 1·1 per cent. less than the original. If it were possible for all the ethylene contained in the coke oven and coal gas produced in England to be treated for the formation of alcohol, it is calculated that a supply of fifty million gallons of the spirit would be available per annum from these sources. This estimate presumes a 70 per cent. absorption of the ethylene and a similar conversion factor for the ethyl sulphuric acid produced. If, too, it were possible to effect benzene recovery from the gases (which, in view of other considerations, is very doubtful—at present) 64 million gallons of this hydrocarbon would also be forthcoming. The aggregate supply of a fuel suitable for employment in internal combustion engines would provide a substantial proportion of our requirements, stated to be a hundred and sixty million gallons per annum, but probably underestimated.

The coke oven gas, from which sulphuretted hydrogen has been removed, is passed in counter current to sulphuric acid maintained at 60° to 80°C., when, at a rate of passage comparable to that employed in the debenzolising of gas, about 70 per cent. of the total ethylene content, reacts to form ethyl sulphuric acid. At higher temperatures than those indicated a better absorption certainly occurs, but at the expense of developed practical difficulties; using lower temperatures, a less efficient absorption is effected.

The acid solution is now boiled with water for the hydrolysis of ethyl sulphuric acid, and the aqueous alcoholic solution is distilled over from suitable apparatus. Rectification of the weak alcoholic solution is effected in a well-known manner.

The dilute sulphuric acid remaining after the hydrolysis of the ethyl sulphuric acid is concentrated, and the product run directly back to the ethylene absorption towers, heat economies being thus effected. Heat exchange is also ensured between the gases coming from the hydraulic mains, and the gases proceeding to the absorption system, so that pre-heated gas comes in contact with the sulphuric acid.

Sulphur dioxide is generated by decomposition of part of the sulphuric acid in both the acid concentrators, and in the absorbing system, and the amount of this gas is sufficient to serve for the purification of the original gas by means of the reaction—

$$SO_2+2H_2S=3S+2H_2O.$$

A slight excess of sulphuretted hydrogen over that demanded by theory is allowed, and the final purification is carried out in a single purifier box of the ordinary type. The prepared iron oxide in the latter serves also as a filter for the sulphur precipitated by the meutral action of the sulphuretted hydrogen and the sulphur dioxide. It is calculated that the amount of sulphur which could be obtained is sufficient for the manufacture of the quantity of sulphuric acid required in the process of alcohol production, and also for neutralisation of the by-product ammonia.

The above bare outline can give but a vague idea of the thoroughness with which the problem has been studied. It may serve to show, however, how well-known chemical reactions are being applied by modern technologists, when the economic conditions of the time indicate a favourable opportunity for profitable research.

Ethyl Alcohol from Acetaldehyde

The application of technical skill to the development of a well-known chemical reaction is well exemplified in the case of the manufacturer of acetaldehyde. It is not many years since this compound was familiar to chemists only in the 100gm. (or so) bottles supplied by German manufacturers of research chemicals. During the war it was produced by the Canadian Electro Products Co., at the rate of many tons per day. The aldehyde was oxidised to acetic acid, and the latter converted into acetone, all the processes being facilitated by suitable catalysts.

Acetaldehyde is also being manufactured in England by the British Cellulose Co., who operate according to the Dreyfus patents.

The conditions for the manufacture of acetaldehyde in large quantity have been studied in great detail, and the following are the views of Dreyfus (British patent, 1917, No. 105,064).

A slow current of acetylene is passed into a solution of sulphuric acid containing from 10 to 15 per cent. H_2SO_4. The solution also contains from three to six per cent. of mercury, added as mercuric oxide. At a temperature of 25°-40°C., the formation of the true intermediate catalyst soon takes place, when the speed of the current of acetylene can be increased. Vigorous agitation is maintained, and from time to time the acetaldehyde is distilled off, by raising the temperature to 60°. The temperature is, however, reduced before the acetylene passage is resumed, in order to minimise the production of condensation products of acetaldehyde.

The question of the "life" of the mercuric catalyst is not discussed, nor is the yield of aldehyde per unit of catalyst employed. (This point is considered later.)

The Canadian Process

The conditions under which the hydration of acetylene is effected by the Canadian Electro Products Co. differ only in detail from those described above.

Acetylene is passed into a 6 per cent. solution of sulphuric acid, at a temperature of 60°C. to 65°C. The acetaldehyde, which is formed under the influence of 0·25 per cent. of mercuric oxide catalyst, is carried away by the large excess of acetylene employed, namely, 70 cubic ft. per minute per 1,000 gallons of reacting solution. The rapid removal of acetaldehyde from contact with the heated acid solution prevents or minimises the formation of condensation products of aldehyde. The latter is condensed by means of chilled brine cooled condensers, any uncondensed vapours being retained by solution in water flowing through scrubbers, in a fine state of division. The excess acetylene escaping from the scrubbers is recirculated.

The solution in the "kettles" is maintained at the required

temperature by cooling, as the reaction is exothermic, and its concentration is kept constant by suitable additions, as required, of acid, water and mercuric oxide.

During the process, a sludge of reduced mercury compounds is produced, but is kept in intimate contact with the acetylene by vigorous agitation. As, however, the catalytic activity is greatly reduced in time, the solution is allowed to settle from time to time, as occasion demands, and the inactive sludge is removed for recovery of the mercury, whilst the solution is returned to the process.

Mercuric oxide is regenerated from the sludge of mercury and mercury organic compounds by a suitable electrolytic oxidation process.

The acetaldehyde is rectified by distillation of the product from the condensers, and by distillation and fractionation of the aqueous solution from the scrubbers.

Catalyst Recovery

One of the chief difficulties and sources of expense attaching to the process is the small amount of aldehyde produced per unit of catalyst employed. The troublesome recovery process has to treat comparatively large quantities of the mercury sludge. In this connexion two recent Patents of Hilditch and Crosfield British Patents (Nos. 124,702 and 131,084) represent a great advance upon previous practice. In these processes, the hydration of acetylene is carried out in exactly a similar manner to the above, but when the absorption of acetylene slackens, due to the decline of activity of the catalyst, the latter is regenerated *in situ*, by means of a suitable oxidising agent. Manganic and permanganic acids and their salts, which are soluble in water and therefore readily reacted upon, may be used, but it is preferred to employ an insoluble oxidiser, such as a higher oxide of lead, cerium dioxide, manganese dioxide, or the like, which react slowly, and regenerate the reduced mercury sludge by oxidation, in preference to becoming reduced by the acetylene, as in the case of soluble oxidising agents.

By using a suitable oxidiser, the process of hydration of acetylene can proceed for a much longer period than formerly, and the yield of aldehyde per unit of catalyst employed is greatly increased.

Hydrogenation of Acetaldehyde

The hydrogenation of acetaldehyde to form ethyl alcohol was described by Sabatier and Sendrens. In the collected records of their work they state that the operation is fairly easily effected in the presence of reduced nickel or copper catalysts. The temperature of hydrogenation may vary within wide limits, the upper being set by the temperature at which the decomposition of aldehyde into methane and carbon monoxide becomes appreciable.

The process has been adapted on a commercial scale by the Elektrizitatswerk Lonza, in Switzerland.

Acetaldehyde is mixed with a large excess of hydrogen, and passed over a reduced nickel catalyst, at about 150°C., or lower. The reaction is intensely exothermic, and the large excess of gas assists in the removal of the hydrogenated product from the influence of temperature, and protects the easily-decomposed aldehyde from local overheating, due to heat evolution. The product is condensed and rectified.

The original Swiss patent, 1916, No. 74,129, was amplified later (compare British patent, No. 134,521). In this specification the use of hydrogen containing a small proportion of oxygen is suggested. It had been found that using pure hydrogen in the process resulted in the formation of alcohol containing ether. By the use of hydrogen containing 0·3 per cent. of oxygen, however, over 90 per cent. yields of alcohol with no ether as impurity were obtained.

No details are available as to the costs of the process, which must depend upon the loss by decomposition of aldehyde, loss of hydrogen in the circulating current, the "space-time" yield, the life and ease of recovery of the hydrogenating catalyst, and the ease of rectification of crude alcohol (if complete conversion of aldehyde is not effected). It has, however, been reported that the financial result of the process has not been too satisfactory, but even in this case it should only be a question of adjustment before an admittedly delicate reaction is operating satisfactorily on a technical scale. The fundamental economies of the series of reactions from calcium carbide through acetylene and aldehyde to alcohol may be faulty, say, by reason of the high cost of coal and lime in Switzerland, where, of course, cheap electrical power is available, but it has nevertheless been demonstrated that the production and hydrogenation of acetaldehyde on a large scale are operable processes.

Electrolytic Hydrogenation

The preparation of ethyl alcohol by electrolytic hydrogenation of aldehyde follows naturally upon the catalytic hydrogenation and will be briefly indicated in closing. The method, not yet in technical operation, is described in Pascal's British patent, No. 140,115.

Acetaldehyde or paraldehyde is added from time to time to the kathode chamber of an electrolytic apparatus, using 5 to 10 per cent. sulphuric acid as electrolyte. The temperature maintained by the heat of reaction is set at 40°C. Under suitable and prescribed conditions of current density, alcohol is produced. If, however, the porous diaphragm separating the anode and kathode compartments is absent, ethyl acetate is obtained, resulting from the esterification of the acetic acid produced by oxidation of the aldehyde at the anode, with the ethyl alcohol produced by hydrogenation at the kathode.

Ethyl alcohol may be produced directly from acetylene by passing the latter into the kathode compartment of the electrolytic cell, in which is also present a mercuric oxide or salt catalyst for the catalytic hydration of acetylene. The aldehyde formed *in situ* is hydrogenated, as before, by the nascent hydrogen produced by electrolysis.

Key Industries

Restrictions on Enemy Aliens

THE *London Gazette* states that the Board of Trade, in pursuance of the powers conferred upon them under Section 11 of the Aliens Restriction (Amendment) Act, 1919, have issued the following list of "Key" industries: 1. The manufacture of synthetic organic dyestuffs, colours and colouring matters; 2. The manufacture of organic intermediate products used in the manufacture of synthetic organic dyestuffs, colours, or colouring matters.

Under Sub-section 1, Section 11, of the Act, it shall not be lawful during a period of three years from the passing of the Act for a former enemy alien, either in his own name or in the name of a trustee or trustees, to acquire (*inter alia*) any interest in a key industry, or any share or interest in a share in a company registered in the United Kingdom which carries on any such industry; and under Sub-section 3 of the same Section of the Act the Board of Trade is empowered to issue a list of key industries.

As a result of researches carried out by the Australian Institute of Science and Industry on the Zamia palm, a company has been formed in Sydney, called the Austral Starch Co., to exploit the Institute's suggestions. Already one factory had been erected on the south coast of New South Wales, and is commencing operations for the conversion of RAW STARCH FROM THE ZAMIA PALM. The New South Wales Forestry Commissioner has granted a licence to the company to obtain Zamia bulbs from an area of about 31,000 acres. The licence which holds good for 10 years, is subject to the express conditions that the company shall manufacture not less than 50 tons of dry starch half-yearly.

Muriate or Sulphate of Potash

To the Editor of CHEMICAL AGE

SIR,—The statements made by Mr. Hughes in reply to my letter in your issue of the 26th ult. seem to upset the principles of rational manuring as taught by the leading agricultural authorities in this country. Mr. Hughes is obviously unable to put forward any convincing data to support what he calls facts, and consequently it must be assumed that he is expressing only his personal opinions.

Every practical farmer knows that the unlimited use of nitrogenous and phosphatic manures alone for grain crops is not economical, the limit of quantity being determined by the amount of potash available for the full development of the roots for the formation of the grain, and for the building of cellulose to strengthen the straw and prevent the lodging of the crop. Many of the lighter soils on which oats are extensively grown in England, and more particularly so in Scotland, are decidedly deficient in potash, and although Mr. Hughes points out that grain crops do not remove a large amount of potash from the soil, yet on examining the results of experiments carried out by the Department of Agriculture in Ireland over a period of 11 years, it will be found that the average increase due to potash manuring is 4 bushels per acre (1 cwt. 2 qrs.).

It must therefore be concluded that the supply of potash in the soil is generally insufficient for grain crops, unless, indeed, Mr. Hughes can produce more exact evidence to prove the contrary.

Other grain crops respond equally well to potash, as is shown by the results from the Broadbalk Wheat Field, Rothamsted, where the average increase due to potash for a period of 61 years has been 8.1 bushels of grain and 9.2 cwts. of straw per acre.

In regard to the manuring of oats Sir Robert Patrick Wright states: "The experiments of the West of Scotland Agricultural College, confirmed subsequently by those of the Irish Department of Agriculture show that the *best* returns are obtained from manures which supply nitrogen, phosphoric acid and potash, the quantities generally suitable being 2 cwts. superphosphate, 2 cwts. kainit, with ½ cwt. nitrate of soda and ½ cwt. sulphate of ammonia per acre." In reference to barley he says:—"The use of a combination of all three manurial ingredients gives the largest crops, the heaviest and plumpest grain, and the earliest harvest."

It is unfortunate that Mr. Hughes in his official capacity should advocate the use of second and third rate grain manures which contain no potash. An examination of the trade circulars of all the reliable fertiliser manufacturers in this country reveals the fact that grain manures of first class quality always contain potash, and it must be understood that these manures are prepared to give the best results and the most economic returns, as ascertained from the evidence supplied over a great number of years by practical farmers in all parts of the country.

Under the ordinary system of farming practised in this country, a great proportion of the potash removed in the straw is not returned to the soil in manurial residues. Where straw is fed to animals the potash contained in it is mostly excreted in the liquid manure, which on the great majority of farms cannot be economically returned to the land.—Yours, etc.,

April 13. FARMER.

Key Industries Bill

To the Editor of THE CHEMICAL AGE

SIR,—Some time this week, circumstances permitting, the "Key Industries Bill" will be introduced in the House of Commons. Being interested in one of those trades—scientific and chemical glassware—we would like to bring to your notice one or two points in which we think the Bill will fail to achieve its object.

We take it that the main objects are that the British manufacturer shall find a market for the articles that he produces, and to find employment for a number of people. The Government propose to do this by imposing a tax of 33⅓ per cent. on those foreign-made articles which are "keyed."

The war taught them that there were a certain number of articles which are absolutely essential for the use "industrially" and for the well-being of the nation as a whole which were not manufactured in this country in pre-war days. These industries have been protected by law, but this was set aside by Judge Sankey on a technical point. The Government promised that they would rectify their error. We ask them to do this, and to carry out their promise to the letter. The proposals set forth in the Bill will by no means fulfil the objects for which it has been framed. We are given to understand that there are political reasons for not introducing the measure as at first proposed. Surely there can be no difference of opinion when it comes to a question of feeding one's own countrymen in preference to foreigners. There ought to be no two opinions whether the choice should rest between the investment of British or foreign capital; especially when the investment of this capital means so much to the industrial existence of the nation.

There is no industry throughout the world but what the chemist is engaged in at some period, and as the chemist cannot work without suitable glassware we maintain that scientific and chemical glassware should be absolutely protected. This trade had its birth in this country during the war, and we ask that the Government shall do their best to give us an opportunity to maintain it. It would only be insulting the intelligence of your readers to explain to them the importance of this industry. They have the knowledge, and it is because of this that we are asking them to give us their support to keep it. We know that they have a fight before them in regard to fine chemicals, and we can assure them that they have the support of those who are concerned in chemical glassware. Our appeal is not made from the employer's point of view, but as employees.—We are, etc.,

J. LEWIS,
C. J. HERNAMAN,
A. C. HARVEY.
For and on behalf of 250 employees,
DUROGLASS, LTD.

Walthamstow, April 11.

Conjoint Board of Scientific Societies

To the Editor of THE CHEMICAL AGE

SIR.—I am directed by the executive committee of the Conjoint Board of Scientific Societies to state that at the general meeting of the board held in March last, it was decided to discontinue the publication of the Annual Calendar and Fortnightly Bulletin of Scientific Meetings (Diary of Scientific and Technical Societies), owing to the heavy printing liabilities incurred.—Yours, etc.,

W. W. WATTS,
Secretary and Treasurer.

Patent Law Lecture

To the Editor of THE CHEMICAL AGE.

SIR,—In your esteemed publication of February 19 is an article entitled "Patent Law and Chemical Research," which is an account of a lecture given by Mr. Harold E. Potts, M.Sc., before the members of the Liverpool Section of the British Association of Chemists. Will you be good enough to advise the writer if this lecture is to be published in pamphlet form, and if so, how we may procure it.—Yours, etc.,

National Aniline & Chemical Co., Inc.
GRACE CARSTENSEN,
New York, March 23. *Librarian.*

Reduced Ad Valorem Rates

As the result of negotiations which have been proceeding for some time with a view to the reduction of British shipping companies' *ad valorem* freight rates, the Chemical and Dyestuff Traders' Association has received a communication from the Department of Overseas Trade announcing "that the Magellan Lines have reduced the rate on valuable cargo, (*i.e.*, cargo exceeding £300 per freight ton in value) from 5 per cent. *ad valorem* or 280 shillings per ton to 2½ per cent. or 200 shillings peer ton, whichever pays the steamer better."

Low Temperature Carbonisation

Commercial Uses of Coal

AT a meeting of the Royal Society of Arts on Wednesday, Professor H. E. Armstrong read a paper on "Low Temperature Carbonisation and Smokeless Fuel." Sir Arthur Duckham, K.C.B., presided.

Professor ARMSTRONG said that to-day we were suffering from a "Coalitis" brought on by the unreasoned use of coal as fuel. We were but trying to do with coal to-day what was done successfully a century ago. The future of civilisation depended on our right use of coal and all must learn to treat it with respect.

Dealing with smoke prevention, Professor Armstrong said that not another minute should be wasted in further inquiry into the smoke nuisance; the only possible solution was the use of smokeless fuels, either gaseous or solid.

The lecturer recounted the history of the production of "Coalite," in the invention of which Mr. F. W. Salisbury Jones and the late Mr. T. Parker were chiefly concerned. A great deal of work had also been done in this connexion by the late Professor Vivian Lewes. Subsequently a company was formed for the production of Coalite, in 1906, which proved so successful that it was later decided to form a larger company for the purpose. The enterprise did not receive much support in this country, but the Germans were more alive to its value, and in 1913 a big German coking concern joined with the Coalite Company, but the war put an end to its activities here.

In 1916, however, he visited the works which were in course of erection by the Coalite Company near Barnsley, and was also present when the process was first in operation there. It was seen that no one of the staff had any previous experience of the process, and serious errors in the construction of the plant had been made. The great mistake was that the complete works were erected before the efficiency of the primary unit had been established, and even before the problem was fully understood. The first set of nine ovens were soon rendered useless, but a similar set were erected, which met with partial success. In May, 1919, however the process came under new management, and the company secured the services of Mr. T. M. Davidson, an experienced engineer, who soon grasped the essential features of the problem and met the difficulties in a peculiarly happy way. New plant was built to his designs, which had been in operation since November, 1920. The carbonisation of the coal was carried out in five to eight hours, according to the thickness of the slab of coalite produced.

The lecturer showed a few slides illustrating the ovens and the method of charging and discharging the product. Specimens of the coalite produced in these ovens were exhibited, to demonstrate its structure.

Oil fuel could also be derived from the process, but it was too soon yet to speak of its uses in definite terms. It was different from the ordinary gas works tar, and in his opinion it should not be spoken of as tar at all. Coal oil would be a better term. It had been subjected to the Admiralty test, and had been found to be well within the specification for oil fuel.

Discussion

The CHAIRMAN, referring to the Barnsley plant, said the great drawback to his mind had been that a really satisfactory balance-sheet could not be produced as a result of the process, and that was the reason that it had not been taken up by the gas industry. It all hung on two things, namely, the value of the coalite itself and the value of the oils recovered from the process. He had tried to get a value for the coal oils, but could not; the oils should be of good value, and he had hopes of proving that this was so.

Dr. J. H. HARKER said that during the war, when the Ministry of Munitions was considering the question of the fixation of nitrogen, the whole question of low temperature carbonisation was prominently before the public, and a Committee was formed for the purpose of investigating the problem. This Committee visited the plant at Barnsley and found that a ton of coal, which was worth about £1, would make 14 cwt. of crude coalite, of which rather less than 13 cwt. was saleable as coalite, the remainder being put back into the process. economically, the success of the process depended entirely upon the possibility of selling the coalite at the same 'price as was paid for the ton of coal, and of obtaining a sufficient price for the by-products to cover the cost of running the plant.

Mr. A. SEABROOK said that, from the point of view of electricity supply, he had considered the possibilities of extracting something from coal before burning it under boilers, and had found that the capital cost and the increased labour involved in handling the plant barely equalled the value of the products obtained. He had been experimenting with the Tozer process, which was still in the experimental stage, but we should probably know by the end of the year how this process had turned out.

Mr. W. H. PATCHELL said he had hoped to hear something of the Smith system, operating in America, and which seemed to be one of the best and most promising systems yet evolved. There were two stages, one to make the coke and the other to briquette it. Low-temperature fuels were very friable, and some form of briquetting would have to be adopted. The Nielsen process was also making headway, which was a process of making the coke stick together in a plastic state. Low-temperature coke must be made more adherent, so that it could be better transported.

Mr. G. M. GILL said it seemed to him that the problem with regard to low-temperature carbonisation was to make a coke which would stand handling, and he did not see that that was possible yet while leaving a good proportion of volatile matter still in the coke and only heating it to a comparatively low temperature.

Mr. D. HENSHAW asked the amount of ash contained in the samples which had been shown by Professor Armstrong. If the coal had a high ash content, then no matter what amount of volatile matter was left in it, it still had disabilities which would make a dusty fire. Dr. Mollwo Perkin expressed regret that only one process had been dealt with by the lecturer. He was not at all sure that the dual process, such as the Smith process, was not the best process, because probably with a softer coke they would obtain a larger percentage of breeze. If this breeze could be briquetted it would then be a valuable domestic fuel. As to the ash content in coke, this would depend entirely upon the ash content of the coal before carbonisation.

Professor ARMSTRONG, in reply to the discussion, exhibited a specimen of the oil obtained from the low-temperature carbonisation of coal, which, he said, was absolutely different from coal tar, and could be poured almost like water. As regards the respective value of the coalite and the oil, they should be prepared to pay more for the former than for coal, because it did not burn away so rapidly, and because it was smokeless. As to the oil, the minimum value of the oil was the value of a similar fuel oil at the moment. About 1 ton could be obtained from 10 tons of coal. As to the sample he had exhibited, he thought it was made from a washed coal, and probably did not contain more than 5 or 6 per cent. of ash; no coal should be used if not washed down to that point.

Lord Moulton on Key Industries

PRACTICALLY the last public utterance of the late Lord Moulton was his speech at the luncheon given in his honour by the Association of British Chemical Manufacturers at the Princes Hotel in February last. This speech has now been issued in brochure form by the Association and bears the title "The Late Lord Moulton and the Fine Chemical Industry." The subject matter of this little book, the proof-sheets of which were revised by the author on the eve of his death, has lost none of its use in the interval. One of the outstanding passages in what might almost be referred to as his valedictory message to the nation is to be found in his declaration, "We no more dare leave our great industries at the mercy of a foreign country than we dare trust to a foreign country for our guns or our ammunition."

Recent Wills

Sir L. Fletcher, of Ravenstonedale, Westmoreland, for 29 years Keeper of Minerals at the Natural History Museum, South Kensington, a former examiner in Natural Sciences for Oxford and Cambridge £5,633

Mr. J. R. Walker, of New Cavendish Street, London, W., of Wallas & Co., chemists £6,365

The World's Petroleum Supplies

Our contributor has collected some new and interesting information upon a much-discussed topic. From his summary of American opinion it will be gathered that State interference in America meets with no more success than it has done over here.

THE world's consumption of petroleum is increasing at an enormous rate, and its great advantages as a fuel for warships and the consequent anxiety of the chief Powers to obtain adequate supplies for their navies has very quickly raised petroleum to the front rank among international questions, both political and commercial. The purely political aspects of the question need only be very briefly touched upon here. They are confined at present mainly to the relations between ourselves and the U.S.A. over oil concessions in Mesopotamia. Their importance has doubtless been much exaggerated by the ill-judged and tactless policy of a section of the press in both countries, and Sir Charles Greenway, at the recent meeting of the Anglo-Persian Oil Company, restored matters to their true perspective and very clearly indicated the real point at issue, which is a very simple one. "It is a well-known doctrine of State succession that the Power which inherits alien territory must recognise previously acquired rights of private owners. The Standard Oil Company before the war claim to have acquired certain oil rights in Palestine, which may, for all anyone knows to-day, be just as valuable as the Mesopotamian oil rights. Similarly, we and other nationals acquired rights in Mesopotamia and other parts of the former Turkish Empire. All of these rights will necessarily have to be recognised . . . . There is no question here of the 'closed door' to America, but quite the contrary." Sir Charles Greenway very truly observed that it is difficult to believe that the monopolistic aims which are at the back of a section of the American oil interests' opposition to British policy can receive support from the American nation as a whole; and he added that no one can reasonably object to American producers claiming a fair share of the world's supplies. But every other country in the world is entitled to object to their demanding a permanent 80 to 85 per cent. of the world's supplies, and to resent most strongly their opposition to the attempts of Great Britain and other countries to secure their fair share of these supplies.

The whole question of petroleum supplies, from the American point of view, was very fully discussed at the meeting of the American Petroleum Institute, held at Washington recently. The leading men in the American oil industry were present, together with the directors of the U.S. Geological Survey and the Bureau of Mines, and Mr. Richard Airey, of the Roxana Petroleum Company, representing Great Britain.

Consumption per Head

It is estimated that the demand for petroleum next year will approximate the enormous figure of 700,000,000 barrels, of which America will consume no less than 565,000,000 barrels, or 120,000,000 barrels more than her own production, the deficit in America being made good by importations from Mexico. Mr. W. C. Teagle, President of the Standard Oil Company of New Jersey, who gave these figures, added that the *per capita* consumption in the United States is 200 gallons per annum, as compared with 14 gallons for the whole world. He also said that the United States is now spending its petroleum wealth for the world's benefit, in order to meet 70 per cent. of the world's present demand—a statement which hardly corresponds with the actual facts, or with what he had himself just previously said.

An important feature of the meeting of the Petroleum Institute was the strong claim for freedom from governmental and bureaucratic interference and control. If the politicians would cease from inter-meddling and leave the technical and scientific men to guide the destinies of the petroleum industry it would be better for producers and consumers alike. At present a great deal of oil is being wasted in automobiles, &c., bringing numerous government officials to potter round the oilfields. The Director of the U.S. Geological Survey, Mr. G. O. Smith, urged the extreme importance of conservation and economy in use, and also economy in transportation. He pointed out that the Geological Survey's estimate of the petroleum resources of the world shows that the distribution, while unevenly balanced among nations, is evenly balanced between the eastern and the western hemispheres, although the northern hemisphere appears to have at least five times as much oil as the southern. But the land area of the northern hemisphere is three times that of the southern. The larger unexplored areas are in South America, Africa and Oceania. According to the Stebinger-White distribution of the world's oil reserves, the continents, in order of oil wealth are, North America, Asia, South America, Europe, Oceania and Africa. More than half the world's oil reserves are believed to be concentrated in two intercontinental areas: one bordering the Carribean Sea, and the other the Caspian Sea. Director Smith attached great importance to the vast deposits of oil-shales in the United States and elsewhere, although some of the other speakers expressed the view that the processes of mining the shale and distilling the oil were too costly to enable shale oil to compete with petroleum. This view is not apparently shared by the Anglo-Persian Oil Company, at all events; for this company has essayed to put the Scottish shale oil industry on its feet again, although working expenses have been increased by over £700,000 owing to increased wages, shorter hours and dearer coal. In regard to economy of transportation of oil, Director Smith suggested that the eastern and the western hemispheres should be as independent as possible and cross hauls of oil should be avoided, although he realised it is rather too soon to expect much in this direction so long as five-sixths of the world's oil comes from the western hemisphere. But this is precisely what Great Britain is aiming at in her Mesopotamian policy, for it would manifestly be absurd to burn oil in carrying oil from west to east if supplies were available nearer home.

Mr. Richard Airey, of the Roxana Petroleum Co., in a speech which was well received by the meeting, said that Great Britain could not complacently behold her utter helplessness in the matter of petroleum supplies, for her requirements are enormous and ever increasing; but she was certainly not attempting a "closed door" policy in Mesopotamia or anywhere else. In fact, the open door policy was already in operation in the British Empire, for American interests are developing the oil resources of Canada, and were also represented in Trinidad. It would be utterly useless for Britain to attempt a world monopoly in view of the strong grip which America already has of the world petroleum industry both within her own borders and in Mexico.

Future Production

Two important contributions on the subject of future production of petroleum were given, one by the President of the Institute, Mr. Thomas O'Donnell, and the other by Mr. R. D. Benson, president of the Tidewater Oil Company. The main point in the latter speech was that existing production was far below what it might be, and without bringing in any new wells the output of crude could be vastly increased—if a sufficient price were paid for it; and Mr. Benson supported his contention by numerous statistics showing the relation between prices and output. It would be unkind to draw the obvious inference that it is not so much love for the rest of the world as love of the dollar that is the real stimulus to American petroleum production. Of course, this holds good in other countries beside the States, but then other countries do not perhaps say quite so much about their generosity and altruism. President O'Donnell admitted that there was at present a serious world shortage, but he was optimistic concerning the future, and referred to various "important discoveries" of oil in different parts of the world, and said that vast areas of promising geological structure had hardly yet been scratched. He strongly urged the removal of government control and interference: "We have far too much Government." It is interesting to note that Sir Charles Greenway also thinks there is no ground for pessimism. The real difficulty is that new supplies of oil cannot be opened up as quickly as supplies of coal, or as quickly as ships can be built or converted. Not only have the oilfields to be located but a vast amount of constructional work is needed. Although the world's production to-day may not be more than 10,000,000 tons—after deducting that consumed

internally by refineries and on railways—he (Sir Charles) saw no reason to doubt that this will be increased to 50,000,000 tons, only reckoning output from existing proved fields. This is equivalent to about 175,000,000 tons of coal for burning in Diesel engines. He fully endorsed what Lord Pirrie had said as to the wastefulness of burning liqiud fuel under boilers for steam raising, and as to the risk of building or converting ships for oil fuel without first making sure of supplies. The Anglo-Persian Oil Co. is doing its best to ensure such supplies for shipping, and through its associate, the British Oil Bunkering Co., Ltd., is establishing bunkering installations in all the principal ports of the world. At present 19 installations have been erected, and 25 more are planned.

Fuel Stations

The United States Navy will be a large consumer of oil, and during the coming year, according to Admiral Benson, 40,000,000 barrels will be required, and fuel oil bunkering stations will be established by the U.S. Shipping Board at strategic ports on the established trade routes. One has already been established at Hassel Island, St. Thomas, V.I., with an ultimate storage capacity of 220,000 barrels; another at Honolulu, capacity 110,000 barrels; and a third at Manila, capacity 165,000 barrels. Arrangements have been made with certain oil companies to store oil for the U.S. Navy account at Shanghai, Iquique, Rio de Janeiro, Bizerta, Brest, Genoa, Savona, and Hamburg. Admiral Benson said that, of the 140 Shipping Board vessels operating from Pacific coast ports, only one burns coal as fuel, and that about 75 per cent. of the entire U.S. fleet burns oil fuel.

Other interesting papers read at the meeting of the Institute included one by Mr. N. A. C. Smith, of the Bureau of Mines, on oil-testing methods; another on the same subject by Dr. Herschel; and a paper on fuel utilisation by Mr. O. P. Hood, of the Bureau of Mines. A further contribution to the technology of petroleum is a bulletin (No. 200) which will shortly be issued by the Bureau of Mines, dealing with methods of determining petroleum evaporation losses, the author being Mr. J. H. Wiggins, Petroleum Engineer of the U.S. Bureau of Mines.

Australian Explosives Industry

Big Developments Proposed

As announced in THE CHEMICAL AGE last week the Defence Department has taken over the works of the Colonial Ammunition Co., at Foots Cray, Victoria. In this connexion a *Times* correspondent writing from Melbourne states that this acquisition has caused some anxiety among manufacturers who are entirely dependent upon the Company for supplies of copper, brass and nickel sheets.

No other firm in Australia is producing these materials, and since the Government has expressed its intention of concentrating upon the production of ammunition, dependent industries are placed in a somewhat awkward position because to encourage the production of metal sheets a high duty was imposed last year upon importations. A movement, however, is afoot to form a new company to take over from the Defence Department that section of the Colonial Ammunition Company's works dealing with the manufacture of copper, brass and nickel sheets.

Another important move, he states, has relation to the manufacture of explosives, dynamite, gelignite, and gelatines. The Australian Explosives Company, an offshoot of the big British combination headed by Nobel's, of Glasgow, has extended its works outside Melbourne with the object of supplying the bulk of Australian requirements. Negotiations are proceeding for the formation of a purely Australian company to take over the industry which has been assured of adequate protection.

Change of Address

WE are informed that A. Connell & Co., 3, Jewry Street, E.C.3, dealers in dyestuffs and chemicals, &c., have been obliged by the extension of their business to secure larger premises. This necessity arises, fortunately, at the expiration of the lease of their present premises, and they desire that after April 15 all communications to the firm should be addressed to 20, Bevis Marks, London, E.C.3. The telephone number remains the same (Avenue 1945).

Chemical Methods in Photography

Hypo a Potential Freezing Mixture

A LECTURE on chemical methods in photography was delivered by Mr. C. M. Thomas, at the ordinary meeting of the Royal Photographic Society on Tuesday, April 5, the President (Dr. G. H. Rodman) in the Chair.

Mr. Thomas pointed out that the chemist had oftenest to do with the actual mass of a substance, while the photographer was more concerned with questions of relative mass or the concentration of his solutions. The chemist might prefer to express his solution in gram metres per litre, and the photographer in fluid grains per ounce. The photographer was concerned to know three things: the concentration of the developer, the temperature, and the time during which it acted. Variations in concentrations were not of such vital importance as variations in the other two factors.

He pointed out the advantages of the 10 per cent. stock solution, which worked well, occupied little bulk, and saved much calculation, but it had a disadvantage in the case of developers where the quantity required was too small to measure accurately. He would not like to measure out 10 minims—which were drops in size—in the dark room, and therefore he only approved of the 10 per cent. solution where the quantities ranged above 40 minims. The most convenient measures for measuring and compounding solutions were, for the metric system, one of 25 c.cs., and another of 100 c.cs., and for English measures, one of two drams and another of five ounces.

Among other things he pointed out the extraordinary fall in temperature which took place when hyposulphite of soda was added to water. One had the making of a freezing mixture in hypo, although the temperature of the room prevented actual freezing from being obtained. The lecture was illustrated by experiments at many points.

Australian Fuel Products

Progress in Dyestuffs and Tanning Research

THE Australian Commonwealth Bureau of Science and Industry has established a laboratory at Perth for the investigation of the possibilities of utilising forest products to greater advantage. The work of the laboratory comprises paper making from Australian materials; impregnation of hardwoods by preservatives, with special reference to powellising and tanning materials. The Minister controlling the institute stated recently that during 1920 paper investigations had been mainly confined to the testing of the pulping quality of timber from the various States. This work was practically complete, and a report was being prepared setting out the results. Pulping trials indicated satisfactory results from several of the common eucalypti.

In connexion with the preservation of timber, the claims of the Powell process had been investigated, and it had been clearly established that as far as complete penetration by the arsenic and the fixing of the sugar in the timber were concerned these claims were justified.

The tanning experiments from Western Australian woods were in hand, and would eventually lead to complete knowledge of the different materials in the State. The problem of using the red gum kino of Western Australia was receiving attention, and it was hoped the result of these investigations would be to render an immense quantity of this material commercially valuable in connexion with the investigation regarding plants of economic value. An interesting experiment is now in hand relative to dyestuffs from common trees in Western Australia. The results so far, it is stated, indicate a good range of shades in fastnesses at least equal to those of dyes now commonly used. This applies more particularly to brown colours.

The Dyestuffs Committee

Appointment of Chairman

THE Advisory Committee on Imports under the Dyestuffs Act has now been definitely completed by the appointment of Sir Harry Vernon Kilvert, of The Lodge, Ashton Lane, Ashton-on-Mersey, as chairman. Sir Harry is a director of N. Kilvert & Sons, Ltd., of Manchester, deputy-chairman of the Lancashire Dynamo & Motor Co., Ltd., and a prominent member of the Manchester Chamber of Commerce.

Working of the Reparations Act

How the British Consumer Pays

THE following statement is issued by the Chemical & Dyestuff Traders' Association as to the working of the German Reparations (Recovery) Act :—

"Numerous inquiries have been made among chemical and dyestuff merchants as to the operation of the German Reparations (Recovery) Act, particularly in reference to its effect on trade, and the point whether the tax is paid by the German exporter or by the British importer. The replies show that up to now the assumption that the tax would fall on Germany is not being realised. Merchants almost without exception state that the German exporter refuses to deliver goods until he or his agent is paid in full. The general result is that either business is suspended altogether or that the British importer pays the German exporter in full and himself pays the duty to the British Customs authorities.

"Inquiries have been made of H.M. Commissioners of Customs, and their ruling is that the British importer can pay for German goods in full, provided he accepts liability for the subsequent payment of the duty. In practice this ruling works out as follows : Where the price of the German goods is, say, £100, the British importer may pay the £100 in full to the exporter. The duty on this amount is 50 per cent., and the British importer will therefore be required to pay a further £50 to the British customs. Under this procedure the German exporter incurs no penalty, but the goods cost 50 per cent. more than their ordinary value, and this extra £50 has to be charged to the British importer's customers.

"It has been suggested that in order to relieve himself of the duty the German exporter would add 50 per cent. to the cost of the goods. This, however, would not protect him. Such an addition would convert £100 into £150, and if each party paid half (£75) the German would receive £25 less than the full value, while the British importer would pay £25 more than the ordinary duty. It will be seen, therefore, that to protect himself the German exporter would need to double the amount. In that case £100 worth of goods would be invoiced at £200. The German would get half of this, being the full original value of the goods, while the remaining £100 would be paid in the first instance by the British importer and passed on to his customers.

"There would appear, however, to be no need to resort to the expedient of doubling the value of the goods. So long as the British Customs authorities allow the British importer to pay the German exporter in full and to pay the 50 per cent. duty himself, the German receives the full value, and the 50 per cent. duty is paid by the British consumer."

A Corrected Ruling

As going to press we are informed that the above ruling has been corrected, and that where the British importer pays £100 to Germany direct, he will be required to pay £100 also to the British Customs.

German Reparation Act

Board of Trade Orders

THE first and second orders of the Board of Trade under the German Reparations (Recovery) Act, 1921, were published in the *London Gazette* on April 8.

The first order provides that "Any article of the following description if imported into the United Kingdom before May 15, 1921, shall be exempt from the provisions of the said Act, that is to say, any article in respect of which it is proved to the satisfaction of the Commissioners of Customs : (*a*) That a contract was entered into before March 8, 1921, and (*b*) That a sum of not less than 20 per cent. of the purchase price was irrevocably paid before the said March 8, 1921, in pursuance of such contract ; or (*c*) That the physical possession and property in the article the subject of such contract had passed to some person other than a German national prior to the said March 8, 1921."

The second order ordains that the provisions of Section 4 of the Act shall be extended so as to include contracts for resale which were entered into by any importer before March 8, 1921.

Breach of Contract Claim

Arbitration Award to Stand

ON Tuesday, in the King's Bench Division, Mr. Justice Shearman had before him in the form of a special case the arbitration proceedings between John Batt & Co., Ltd., London, and the Aniline Dye & Chemical Co., which referred to the breach of a contract for soda ash and caustic soda. Mr. T. Mathews appeared for John Batt & Co., and the Chemical Co. were not represented.

Mr. Mathews stated that his clients were the applicants in the arbitration and the respondents in the Court proceedings. The respondents in the arbitration were the Chemical Co. and they asked for an official case to be stated. The award was in favour of his clients for £7,050 damages. His clients complained that the Chemical Co. had broken their contract by which they undertook to sell to Batt & Co. 400 tons of soda ash and 100 tons of caustic soda. Under the arbitration proceedings Batt & Co. asked for difference between the contract price and the market price. The Chemical Co. had failed to ship the goods. The point raised by the sellers was under the red-ink clause in the contract, viz., the price of goods sold under the contract was to be advanced from time to time and the present price of raw materials and current rate of wages increased owing to the action of the Government, and buyer shall have the option of saying whether on the advance he will accept it or refuse to have the goods. Counsel added that before the breach of contract no notice was given by the sellers to the buyers.

His lordship ordered the award to stand and ordered the Chemical Co. to pay Batt & Co. £7,050 and costs.

Dyestuffs Legislation Criticised

The Free Trade Point of View

AT a demonstration of employers and workpeople, held in the Free Trade Hall, Manchester, on Thursday, April 7, and attended by several chemical and dyestuff trading firms, the recent dyestuffs legislation came in for considerable criticism.

The chairman (Sir E. Tootal Broadhurst) said that the Free Trade principles of the country had been attacked by the Dyestuffs Act and the Ways and Means Resolutions for safeguarding industries. They had been accused of having been caught napping over the Dyestuffs Bill, but they were not going to be caught napping now.

Lord Emmott, in moving a resolution denouncing the insidious attacks on Free Trade by the passing of the Dyestuffs Import Regulation Act, by the promised legislation for the protection of selected industries, and by the proposals against freedom of imports, said the worst method of all adopted by the Government was that of the Dyestuffs Act. A huge monopoly had been created by the Government called the British Dyestuffs Corporation. It was over-capitalised. The Government were large shareholders, and they gave a promise of legislation to protect the shareholders. So far as he remembered, this was the first occasion on which the Government had interfered in stock-jobbing. The Ways and Means Resolutions he described as highly obnoxious.

Sir W. Barton, M.P., in seconding the resolution, said that up to now the whole operation of the Dyestuffs Act had ended in fiasco. As to the protection of industries by the imposition of a tax of 33⅓ per cent. on imports, he had been frankly told in the case of one industry, "Don't talk of 33⅓ ; we need at least 300 to 500 per cent."

The resolution was carried unanimously.

AMALGAMATED ZINC (DE BAVAY'S).—The report for the half-year ended December 31 last states that owing to industrial disputes the mill was working only during the last six weeks of the period. The loss on working account was £13,576, which was arrived at after transferring to depreciation reserve £8,559 and taking into account £12,896 increased profit from adjustments of previous periods. The loss transferred from profit and loss account to appropriation account was £16,652, which has been absorbed by the credit balance of £7,089 brought forward and £9,563 transferred from equalisation reserve. In the half-year ended December 30, 1919, there was a profit of £13,689, including £19,455 increased profit from adjustments of previous periods.

Society of Public Analysts

AT the ordinary meeting on Wednesday, April 6, held at the Chemical Society's Rooms, Burlington House (Mr. Alfred Smetham, president, in the chair), certificates were read for the first time in favour of Messrs. William Ellard Woolcott and Thomas Henry Pope, B.Sc., F.I.C. A certificate was read for the second time in favour of Mr. Percy N. Mould.

The following were elected members :—Messrs. Jules Cofman-Nicoresti, Walter K. Fletcher, William Singleton, James Darnell Granger, Ph.D. (Berlin), F.I.C., Edward Bradford Maxted, Ph.D. (Berlin), B.Sc. (Lond.), Russell George Polly, F.I.C., Francis George Henry Tate.

Abstracts of Papers

In a paper on "The Estimation of Strychnine in Scale Preparations containing Quinine and other Cinchona Alkaloids," by Messrs. T. F. Harvey and S. Back, it was pointed out that the determination of strychnine in a scale preparation containing iron and quinine was a matter of some difficulty. Existing methods for the separation of these two alkaloids were discussed. Some of these were useless, whilst others gave satisfactory results on pure alkaloids, but failed when applied to the somewhat altered alkaloidal residues obtained in the analysis of scale preparations. The method recommended by the authors, which had so far proved satisfactory in practice, was based upon two existing methods, viz., the tartrate method of Harrison and Carr, and the ferrocyanide method of Simmonds. The greater part of the quinine was directly precipitated as tartrate from an aqueous solution of the scales, an aliquot part of the filtrate being used for the extraction of the strychnine and residual quinine, the separation being then completed by the precipitation of the strychnine as ferrocyanide. Characteristic strychnine residues were mostly obtained. Check experiments were made. The occurrence of small quantities of other cinchona alkaloids was shown not to interfere, with the exception of quinicine, the behaviour of which was described.

Mr. J. L. Lizius, in a paper on "A Method for the Determination of the Acidity of Coloured Solutions," explained that the method consisted of passing the approximately neutralised coloured solution through a filter paper previously treated with the indicator solution. Small quantities of standard alkali or acid were added to the solution which was then refiltered, and this procedure continued until the filter paper gave the permanent coloration of the indicator.

"The Action of Water on Lead" was dealt with in a paper by Mr. J. C. Thresh. The author referred to the conflicting views held with reference to this action, notwithstanding the large number of chemists who had attacked the subject. He, therefore, commenced "*de novo*" and found that water free from dissolved oxygen had no action on lead, but if free oxygen were present action began instantly and continued until all the oxygen was used up, the rate of action depending on the amount of oxygen present. He proceeded to enter into theoretical explanations as to the chemistry of the reactions.

In a paper on "A Colour Reaction for Aconite," by Mr. S. Mellaneh, the author stated that colour reactions at present known for aconite were really those of benzoic acid, and that colour reactions generally were seldom useful unless applied to pure alkaloids. He had devised a method which appeared to be specific for aconite and was very delicate, involving the use of potassium ferricyanide and formic acid. This the author considered very useful for medico-legal purposes, particularly in India, and it was applicable not only to the pure alkaloid but also to the powdered root.

Germany's Export of Sulphate of Copper

ACCORDING to the German Press the Self-Governing Organisation of the Metal Industry (Metallwirtschaftsbund) decided on February 24 that the amount of sulphate of copper allowed to be exported should be increased from 50 per cent. to 75 per cent. of the production for the months of March and April, the decision to take effect as from March 15. According to reports available the production of copper sulphate approximates to that in 1920, when it is estimated that the following quantities were probably exported : In February, 300 tons ; in March, 380 tons ; in April, 350 tons.

A New American Solvent

A NEW YORK correspondent sends us an account, as given by Dr. Victor Lenher, professor of chemistry at the University of Wisconsin, of a new solvent, selenium oxychloride, which further tests are reported to show to be more powerful than was originally claimed in Dr. Lenher's preliminary communication to the American Chemical Society.

"Selenium oxychloride," our correspondent states, "dissolves rubber, glues, enamels, hydrocarbons and many other substances which hitherto have been regarded as resistant to all chemical agencies except fire. Such products as redmanol, bakelite and condensite, which are used as substitutes for amber in the making of tobacco pipes and for many other industrial purposes, and until now have been regarded as insoluble in all known solvents, are readily dissolved by selenium oxychloride, according to Dr. Lenher. By its use ordinary paints, varnishes and shellacs can be removed from furniture and carriages and other objects without injuring the wood, and enamels can be taken from automobiles without affecting the steel body. Its solvent powers are so vigorous, said Dr. Lenher, that it will remove the bitumen from soft coal, but will not attack the pure carbon of anthracite.

"Dr. Lenher also sees a military power in this powerful solvent, as it can be employed in making more porous charcoals contained in the filter material of war gas masks, a process known as activation. The cocoanut charcoal used in the gas mask can be activated by this new reagent by treatment at ordinary temperatures, which is a considerable advance over the older steam activation at a white heat. The use of activated charcoal in the extraction of gasoline from natural gas is one which is interesting chemists, as it will tend to increase the supply of fuel for motor vehicles and still leave the gas available for household and industrial purposes. As a laboratory reagent, Dr. Lenher said that the properties of selenium oxychloride are so unusual that it is likely to come into common use wherever research is conducted.

"The solvent, which formerly was regarded as merely a laboratory curiosity, is finding its place in many industries. The original statements concerning its exceptional powers have been amply verified by him and a group of students who have been attracted to the laboratories of the University of Wisconsin during the last year. The raw material from which it is obtained was once a waste product from the electrolytic refining copper, for until recently the selenium from these electrolytic slimes, while known to the chemist as a rare element, had been considered as almost valueless. The solvent itself is a heavy liquid, and nearly colourless. This discovery of everyday uses for a substance formed from discarded material is regarded by scientists as a typical illustration of the value of research."

Lautaro Nitrate Company

New Directorate to be Appointed

AN extraordinary general meeting of the Lautaro Nitrate Co., Ltd., was held on April 9 at River Plate House, E.C. Mr. Henry A. Ran, who presided, said the meeting had been requisitioned by certain shareholders for the purpose of removing the present directors, and, after a brief statement, called on one of the requisitionists to move the first resolution.

Mr. J. O. Herrera, having dealt with matters that had led to the calling of the meeting, thereupon moved : "That the present directors of the company be removed under the provisions of Article 97 of the company's articles of association, on the ground that their views and policy in and about the management and conduct of the affairs of the company are not in accordance with the views and policy of the majority of the shareholders, and that this reason is deemed by this meeting to justify such removal." The resolution was seconded by Mr. Adolphe Juste, and, after some discussion, was carried on a show of hands, and the chairman then vacated the chair and was followed from the platform by the other members of the board.

Mr. Herrera was then voted to the chair, when further resolutions were carried for the appointment of a new directorate.

March Trade Returns

Imports and Exports Down Again

SINCE July last when our total exports were valued at £155,300,383, there has been an almost unbroken decline. The New Year opened badly with a total of £102,711,213, which dropped to £76,226,034 in February and fell a further £529,068 to £75,696,966. Already the stoppage of the mines must have ensured us a further drop next month unless by some miraculous means an export boom intervenes. As compared with the figure for the corresponding month last year there is a decrease of no less than £55,033,772.

Imports at £93,741,654 are down a further £3,232,057 on the February figure and are less by £82,825,425 than in March, 1920.

Dyes and Dyestuffs

Imports of dyes and dyestuffs are generally higher than they were in February. Intermediate coal tar products (including aniline oil and salt, and phenyl glycine) totalled 563 cwt. as against 133 cwt. in the previous month, while alizarine and synthetic indigo, the imports of which were nil in February, amounted to 1,485 cwt. and 1,805 cwt. respectively. Under the heading of extracts for dyeing, cutch is given at 2,102 cwt. as against 1,910 cwt. and natural indigo was 42 cwt. as against 63 cwt.

Calcium carbide, of which 19,219 cwt. were imported in February, shows an increase of 28,467 cwt., while sodium nitrate, the February imports of which aggregated 133,664 cwt., shows a drop of 75,585 cwt. Other chemicals for which increases are shown are tartaric acid, bleaching materials, borax, crude glycerine, potassium nitrate and zinc oxide. Acetic acid (including acetic anhydride) imports are down by 52 tons. The total value of the month's imports under chemicals, drugs, dyes and colours was £1,276,735 as against £1,457,043 in February, and £2,343,541 in January.

Chemical Exports

Exports under the same heading totalled £1,921,806 as compared with £2,000,552 in February and £3,386,148 in January. Although dyes and dyestuffs exports were recorded at 13,568 cwt. as against 12,429 in the previous month, the values show a decrease of £3,398. As compared with the February exports the following chemicals show increases, the amount of increase being shown in parentheses :—tartaric acid, 1,228 cwt. (497) ; ammonia chloride (muriate), 136 tons (51) ; ammonia sulphate, 18,619 tons (5,141) ; benzol and toluol, 5,244 galls. (1,820) ; tar oil, creosote, &c., 2,568,359 galls. (1,828,703) ; sulphate of copper, 5,431 tons (2,250) ; potassium nitrate, British prepared, 757 cwt. (270) ; caustic soda, 29,446 cwt. (1,131), and zinc oxide, 51 tons (31).

Exports showing decreases on the February shipments (amount of decrease in parentheses) :—sulphuric acid, 5,519 cwt. (6,194) ; bleaching powder, 20,977 cwt. (4,143) ; carbolic acid, 2,918 cwt. (253); naphtha, 588 galls. (7,788); naphthalene, 1,895 cwt. (3,506) ; other coal tar products, 23,254 cwt. (12,371) ; crude glycerine, 1,700 cwt. (4,150) ; distilled glycerine, 3,302 cwt. (1,632) ; potassium chromate of bichromate, 179 cwt. (72) ; sodium compounds : carbonate (including soda crystals soda ash, and bicarbonate), 127,093 cwt. (209,345) ; chromate and bichromate, 1,776 cwt. (115); and sulphate, including saltcake, 27,325 cwt. (21,367).

Coal and Scientific Glassware

During March, coal to the extent of 1,968,078 tons, valued at £4,281,877, was exported ; in the corresponding month last year the quantity was 2,406,151 tons, while in March, 1913, the total was 5,598,774 tons. In January this year the tonnage was 1,700,106 and in February 1,729,148, so that the March figure constitutes a record, so far, for the present year.

Scientific, illuminating, optical, &c., glassware was imported to the extent of 40,757 cwt. valued at £202,597, as against the February total of 40,908 cwt., valued at £232,390. Exports under this heading amounted to 3,535 cwt. to the value of £52,614, compared with 2,845 cwt., of the value of £42,976 for the previous month.

It is stated, in view of the DEPRESSION IN THE SALT TRADE, largely due to German competition, that all the Cheshire employees of the Salt Union have voluntarily accepted a wages reduction of one penny per hour.

Scientific Workers' Union

Universities and Research Work

THE half-yearly meeting of the Council of the National Union of Scientific Workers was held at the University of London Club, on April 9, the President, Professor L. Bairstow, F.R.S., in the chair. There was a good attendance.

The following resolutions were carried unanimously : "That this Council views with misgiving the subordination of scientific workers controlling scientific staffs to non-scientific officials in Government departments. It considers that it is in the best interests of the State that its scientific officers should enjoy the greatest possible freedom from lay interference in connexion with their duties, and should be granted at least equal status and remuneration with that of officials of the highest class in the Civil Service."

"That this Council, having regard to the existing demand for increased educational facilities, deplores the growing tendency of public bodies to reduce expenditure on education, particularly in neglecting to provide for further institutions for the study of science and technology, and by threatening existing institutions with closure, irrespective of their national utility."

"That this Council shall take steps to oppose the tendency to discriminate, solely on account of sex, between the salaries of scientific workers of the same grade and professional standing, and that the Executive Committee shall convey this protest to all scientific bodies and take such other action in this respect as may be feasible."

"That this Council is of the opinion that it is neither practicable nor desirable that research for Government departments or other bodies, demanding the maximum privacy in its pursuit and the greatest strictures on publication, should be undertaken under the auspices of a University or of one of its departments."

"That the Executive Committee of the Union be instructed to draw the attention of University authorities throughout the kingdom to the danger of undertakings (except in a national emergency), research under the Official Secrets Act or similar conditions in University buildings, as the pursuit of such research is hostile to the University tradition of freedom of teaching, research and intercourse, the freedom of the University scientific worker, and the best interests of education."

A Tribute to Sir Edward Thorpe

AMONG the distinguished chemists elected as honorary members of the New York Chemists' Club on the occasion of the tenth annual celebration, was Sir Edward Thorpe, who was represented by Councillor Broderick, of the British Embassy. In presenting him Dr. W. S. Landis said :—

"Sir Edward Thorpe was born near Manchester. A student of science at Owens College, the Universities of Heidelberg and Bonn, a brilliant teacher in several colleges in his native land, at the edge of three-quarters of a century he is professor of chemistry emeritus of the Imperial College of Science and Technology, South Kensington. For many years director of the Government Laboratories in London, his accuracy of methods of analysis and clarity in their exposition, coupled with a wisdom as to human purposes in the interpretation of law, gave a model for municipal experts in caring for the welfare of his fellow citizens. His delightful biographies of famous chemists are examples of charming literary style for others to study and follow. His Dictionary of Applied Chemistry is an authoritative work, turned to by all seeking full knowledge. His researches in pure chemistry carried him to the presidency of the Chemical Society of London ; his exposition and knowledge of technology were recognised a generation ago by a similar demand on the part of the Society of Chemical Industry, and his breadth of appreciation of all science likewise brought him the vice-presidency of the British Association for the Advancement of Science and the Royal Society. His eminence as a scientist, technologist and author, commanding several languages, for he had a large personal acquaintance with savants of foreign tongues, burdened him with honorary and corresponding memberships in numerous scientific, literary and philosophical academies and societies of other lands. Many times doctored, this Fellow of the Royal Society will long remain a teacher of power, even to many who may never hear his voice. We honour ourselves in electing him to be one of that limited number to whom the Chemists' Club can pay such tribute."

The Psychology of Commerce

By Ernest J. P. Benn

WHEN questioned in the House of Commons at the beginning of the war on the propriety of some of the recruiting posters issued by the War Office, Mr. Tennant, then Under Secretary of State for War, excused himself on the plea that "Advertising was a recondite study in psychology." This happy definition, which will be remembered as long as the war itself, applies not only to advertising, but to commerce and trade generally. The science of psychology, as applied to industry, offers a field for research and study which has so far been almost entirely neglected.

The other day a paragraph appeared in the newspapers announcing that the Bexley Urban District Council had succeeded with an experiment in rapid house building, and that the walls of a pair of houses were erected to the roof level in less than nine days, the roof timbers were put on in a couple of days more, and the slating completed within a fortnight from the first work at the foundations. This announcement, striking, startling and exceptional as it is, appeared rapidly upon the declaration of the Ministry of Health that it would undertake responsibility for no more housing schemes. Here, surely, is a study in paradoxes. So long as the Government was prepared to give unlimited orders for houses, so long as there was no fear of any shortage of orders, and so long as employment was assured for an indefinite time ahead, nothing could induce builders to build except at a snail's pace. The moment that there is any fear of orders falling off, as soon as the market shows signs of weakening, then building speeds up, costs tumble down and things begin to move. One would imagine that the socialistic theory of making the work go round would be applied with added force so soon as the principal buyer of houses announces his attention of retiring from the market. But theory seldom works out in business, and that is where socialism fails.

Commercial travellers know more about the psychology of commerce than all the rest of us put together. The salesman who presses does no more good than the golfer who commits the same offence. The aim of the expert commercial traveller is to assume just that degree of independence and indifference which will generate the necessary amount of desire in the breast of his would-be victim. The salesman who is independent up to a point, who avoids the display of anxiety, who knows just how far to rely upon his customer to do his work for him, will achieve successes which are altogether beyond the reach of the man who carries his determination to sell upon his coat-sleeve. Here is a subject which, so far as I am aware, has never been analysed, dissected and reduced to first principles. In fact, it is doubtful whether there are any principles which could be evolved from it; your old traveller would tell you that it is "Personality, Sir," and he is probably right. There is, of course, a certain amount of business done by pressing: there are energetic salesmen who succeed in forcing goods upon an unwilling market, and invariably spoil that market with the result that they have to move on to another. That is not to say that there must be a willing buyer before the salesman is wanted; but the salesman who presses the willingness into the buyer instead of extracting it from him makes the greatest blunder of all.

The total absence of a knowledge of psychology in commerce displayed by those who were called upon to control and regulate us during the course of the war, produced some altogether extraordinary effects, and caused many unnecessary ills. The rationing of bread may be given as an illustration. When the needs of the war made it evident that great efforts must be made to economise in bread, the vast majority of the people reduced their consumption to the minutest minimum. Many people, especially among the elderly folk, discontinued entirely the use of bread in any form, and great was the delight of those who, of their own free will and effort, were thus able to do some little bit of real war work. Then the theorists, impossible and impractical people, came upon the scene and compulsory rationing was put upon us. The immediate effect was that everybody ate the full amount of their ration and wanted more, and to this day it is doubtful whether the psychological effect of the substitution of authority for voluntary effort was not to increase rather than to diminish the strain upon the food resources of the country.

Psychology has been ignored completely by those who, in recent years, have indulged so freely in the modern game of price-fixing. This applies not only to Government Departments but to Trade Unions and to Trade Associations. The fixing of a price and the removal of the excitement of bargaining by taking the elasticity and life out of a market, automatically diminishes the trade done in that market. Since business was first invented, prices have fallen and prices have risen; falling prices were designed to create a desire to buy, and rising prices were invented by the same designer of economic law for the purpose of stimulating a desire to sell. Our modern price-fixers are unaware of the damage which they do, not only to labour and capital, but consumers, by their meddlesome interference with this very human and essential natural process.

Here again we get an excellent illustration of the difficulty if not the impossibility, of reducing the psychology of commerce to an exact science, for a study of some markets shows that the proposition outlined above, operates at times in the opposite direction. Stock Exchange experience is perhaps the best illustration. When prices fall, by the above rule, we ought to buy, whereas the exact opposite is the invariable experience. The moment prices of stocks and shares show signs of breaking, then holders rush on to the market in order to unload before figures go lower still. Many a fortune has been made from the opposite tendency. Experience shows that when the price of a share stays round about a normal figure, business is slow and inactive; but the moment, however, that the price begins to rise, business becomes more vigorous, and this influx of interest pushes the price still higher, so buyers become more numerous until at last a boom is created and exhausted with all the usual results. The psychology of stocks and shares would, therefore, seem to be rather different from the psychology of the building trade.

In the search for first principles, which are so dearly loved by our theorists, the only principle which emerges with any distinction from the study of psychology is, that initiative in industrial or commercial matters must be a natural impulse rising in the mind of some individual. If that natural impulse is allowed perfect freedom, commerce and industry achieve a maximum of activity; any attempt, whether on the part of buyers or sellers, to limit, control, restrict or hinder the operation of that personal initiative must tend to weaken markets, to damp down activity and to defeat the very objects of those who invent these devices.

French Phosphates

Undeveloped Resources of Algeria

OF the five million tons of phosphates which were used yearly in the world, nearly two million tons came in 1913 from Tunis and Algeria, or, more exactly, 1,270,000 tons from the former country and 360,000 tons from Algeria, states the Algers correspondent of the *Manchester Guardian Commercial*. The Algerian exports for 1920 reached 334,704 tons.

The phosphate mines in Morocco are becoming as important in quantity and quality as those of Algeria and Tunis. The Government last year issued a decree there with a view to regulating the exploitation of the mines. At the same time 6,000,000 francs were devoted to the construction in the Port of Casablanca of warehouses, railways, and other special arrangements for the rapid shipment of phosphates. Considerable expenses were also incurred by the Government in order to further the output of the mines in exploitation.

Yet the question of Algerian phosphates, he states, seems to be intimately connected with the exploitation of the mountainous "massif" of Djebel-Onk. The Djebel-Onk is situated in the department of Constantine, 300 kilometres from the sea. This mountain is said to contain one milliard tons of phosphates. At any rate, it is undoubtedly the most important known deposit in the world. The ore contains about 68 per cent. of phosphates, and includes traces of iron and aluminium. The deposits are from 30 to 80 metres in depth and are three kilometres wide. The Djebel-Onk has not yet been put into exploitation, owing chiefly to administrative difficulties. Its annual output, it is estimated, will reach in the first year 600,000 tons, but would soon rise to 2,000,000 tons.

Chemical Matters in Parliament

German Reparation (Recovery) Act

MAJOR BARNES (House of Commons, April 6) asked the President of the Board of Trade (1) whether the Reparation Act would apply to the German stocks already in this country but unsold; (2) whether the 50 per cent. under the Reparation Act would apply to goods bought by merchants in this country from a German firm for shipment from a German port to a foreign port not belonging to England.

Sir P. Lloyd-Greame said the German Reparation (Recovery) Act applied only to goods imported into the United Kingdom after March 31. It did not apply to goods financed in the United Kingdom and shipped from Germany to a foreign country, either direct or after transit through or transhipment in this country.

Anglo-Persian Oil Company

In reply to a question by Mr. Wise (House of Commons, April 6), as to the amount of money the British Government had invested in the Anglo-Persian Oil Co., Ltd., and the percentage of the ordinary dividends since 1913, Lieut.-Commander Young said that the amount of cash invested was £4,250,000. The dividends on ordinary shares had been as follows:—For the year to March 31, 1917 (the first dividend paid), 6 per cent., less tax; for the year to March 31, 1918, 8 per cent., tax free; for the year to March 31, 1919, 10 per cent., tax free; and for the year to March 31, 1920, 20 per cent., less tax.

Key Industries Bill

Major Barnes (House of Commons, April 11), asked the President of the Board of Trade what was the amount of capital registered as invested in the industries named in the first Section of the Financial Resolution governing the Key Industries Bill; and what had been the annual return on such capital during the period for 1914 to 1921?

Sir P. Lloyd-Greame said he regretted he was unable to furnish the information owing to the fact that a large number of the companies with registered capital, producing goods specified in the first of the Ways and Means Resolutions were at the same time engaged in the manufacture of other products which in many cases constituted the main branches of their activities. It was therefore impossible to say what proportion of their capital was devoted to the manufacture of key industry products.

Replying to a question by Captain Wedgwood Benn (House of Commons, April 12), Mr. Chamberlain said he could not say when it was intended to take the Ways and Means Resolution for the Safeguarding of Industries Bill. His two colleagues who were most intimately associated with the subject, the Chancellor of the Exchequer and the President of the Board of Trade, were both occupied with other matters.

Captain Bagley (House of Commons, April 13) asked what considerations governed the selection of the particular commodities set forth in the financial resolution relating to the Key Industries Bill.

Mr. Chamberlain replied that he did not think this was a subject which could be discussed by way of question and answer, but the reasons would be fully explained when the financial resolution came before the House.

Captain Bagley said there was a feeling among members that certain other industries might be regarded as essential. What facilities, he asked, would they have for urging these claims on the House?

Mr. Chamberlain said he was aware that view was held in some quarters, but the proper time would be when the resolution came before the House.

Sir F. Lowe asked whether private members would be able to move to add to the list.

Mr. Chamberlain thought that was a question for the chair.

British Dyestuffs Corporation

Mr. Hogge (House of Commons, April 11), asked the President of the Board of Trade whether it was with the consent of the Government that three gentlemen without any practical knowledge were nominated as directors of the British Dyestuffs Corporation, Limited; whether the services of the two managing directors of the British Dyestuffs Corporation, Limited, had been dispensed with; whether this was done with the knowledge and consent of His Majesty's Government; and whether the board of the company, as at present composed, was without practical knowledge of the industry?

In his reply Sir P. Lloyd-Greame said that the appointment of directors (other than Government directors) of the British Dyestuffs Corporation, Ltd., did not require the consent of the Government, which had not a controlling interest in the Corporation. He said he had no doubt, however, that the three new appointments to which the hon. Member referred would greatly strengthen the Board, and in that connexion he desired to point out that one of the new directors had had much practical experience as managing director of an important chemical works supplying products to the textile trades, whilst another was actively engaged in the dyeing of textiles. With regard to the termination of the appointment of the two managing directors, the Chancellor of the Exchequer was aware of the intention of the board of directors. The consent of His Majesty's Government was not required. The two gentlemen in question would remain on the board of the Corporation. He added that the various changes mentioned were approved by the shareholders at the recent annual meeting, and that the Government proxies were not used.

Chemical Warfare Committee

Mr. Rawlinson (House of Commons, April 12), asked the Chancellor of the Exchequer whether his attention had been called to the great hardship caused to the members of the Chemical Warfare Committee by the insistence of the Treasury, contrary to the wish of the War Office, on a rule that remuneration for services by members of that important Committee should depend upon their being able to prove actual pecuniary loss to themselves by reason of their service on the Committee; and whether, having regard to the fact that some members of that Committee were in receipt of fixed incomes for their services or were engaged on research work which was seriously hindered by the time they gave to the work of the Chemical Warfare Committee, he would arrange that members of the Committee entitled to remuneration should not be compelled to show actual loss?

Lieut.-Commander Young, replying, said that members of Commissions and Committees are usually willing to place their services at the disposal of the country without receiving specific remuneration in cases where they do not incur any actual loss by reason of such service. I see no reason in this particular case to make a departure from the usual rule.

Salt Trade Prospects

ACCORDING to the report of the Salt Union, the prospects for the current year appear to be less promising than they were last year. A cessation of demand, the board states, set in towards the end of last year, which affected both home trade and export, and production was curtailed in consequence. This situation has been much accentuated during the current year. The extensive offering of German salt has added materially to the depression in the trade both at home and abroad. The total exports of German salt to all parts of the world are stated to have exceeded 1,000,000 tons, this being chiefly due to the position of the exchange. It is hoped, however, to effect a large saving in manufacturing costs by an agreement which the union has entered into with the Corbett trustees, whereby it has acquired all their extensive brine and rock-salt rights in Worcestershire in exchange for its Droitwich properties.

Fertilisers in South Africa

IN the last few years before the war the use of fertilisers in the Union of South Africa had become fairly general, but the conditions arising out of the war caused a big decrease in the importation of fertilisers as will be seen from the following figures of imports from the United Kingdom in 1913 and 1919. In 1913 basic slag was imported from the United Kingdom to the extent of 1,707,780 lb. as against nil in 1919, the 1913 total of 2,058,500 lb. of bone manures dropped to 4,500 lb. in 1919 and guano fell from 103,900 lb. to 170 lb. No nitrate of soda was imported in 1919 as against 96 lb. in 1913, and raw phosphate dropped from 313,000 lb. to nothing.

CASTNER-KELLNER ALKALI CO.—Dividend at the rate of 16 per cent. per annum for the six months ended March 31, 1921, subject to income tax, payable May 2. (Same period last year, 20 per cent. per annum.)

From Week to Week

Mr. C. F. GAYWOOD has been appointed managing director of National Alloys, Ltd., Ilford.

The reconstruction of the Buckingham Palace Hotel which is being converted into offices for NOBEL INDUSTRIES, LTD., is practically completed.

Owing to the incidence of German competition, ITALIAN FINE CHEMICAL MANUFACTURERS are about to reduce their hours of work.

The Salt Union, Ltd., have acquired the extensive BRINE AND ROCK SALT rights in Worcestershire in exchange for its Droitwich properties.

The Government has been approached with a view to the inclusion of METALLIC MAGNESIUM within the scope of the Key Industries Bill.

We regret to hear that Dr. S. Rideal has for some time been seriously indisposed and is still too unwell to undertake professional duties.

"Electro-Synthesis in Organic Chemistry" is the subject of the lecture to be delivered before the Royal Institution by Sir JAMES WALKER on April 22.

The Research Committee of the National Union of Scientific Workers is collecting material for a SURVEY OF RESEARCH FACILITIES and research work in Great Britain.

What are supposed to be the largest CALCITE SPAR DEPOSITS in the British Isles were discovered recently in some derelict lead mines at Tokscliff in the High Peak.

A great SCIENTIFIC LABORATORY at Panama is being planned as a memorial to the late William C. Gorgas, Surgeon-General of the United States Army.

At a meeting of the Rhyl Council on Monday it was decided to confirm the appointment of Mr. Thomas as GASWORKS CHEMIST for a further twelve months.

PROFESSOR S. J. HICKMAN, of Manchester University, will deliver a lecture in Leyden University this month on "Post Graduate Research in Science for Foreign Students in English Universities."

Having resigned from the position of Financial Secretary to the War Office, SIR ARCHIBALD WILLIAMSON, M.P., has rejoined the board of the Salar del Carmen Nitrate Syndicate, Ltd.

Mr. F. T. T. Reynolds, chairman of the Executive Council of the Chemical and Dyestuff Traders' Association and governing director of Millwards Merchandise, Ltd., has been elected on the Council of the Free Trade Union.

On Wednesday, at the Bradford Technical College, Mr J. A. REAVELL, managing director of the Kestner Evaporator & Engineering Co., Ltd., gave the first of two lectures on "Evaporation and Concentration."

The death occurred at Blackpool on April 8 of Mr. THOMAS FREDERICK HIND, senior partner in the firm of Hind & Lund, chemical engineers and mill furnishers, of Atlas Works, Preston. Mr. Hind, who was in his 70th year, had recently returned from Madeira.

The general workers at the Port Sunlight works of Lever Brothers, Ltd., are reported to have agreed, through their union, to a wage reduction. Males will receive 6s. less per week, while females will receive 4s. less. A weekly reduction of 12s. was originally proposed.

Of the 18,619 tons of SULPHATE OF AMMONIA exported from the United Kingdom during March, 10,813 tons went to France, 5,043 to Spain and the Canary Islands, 5 to Italy, 1,067 to the Dutch East Indies, 370 to the British West Indies, and 1,321 to other countries not specified.

The Director-General, Ordnance Survey, INVITES TENDERS for the supply of sulphuric ether, absolute alcohol, glacial acetic acid and silver nitrate during the year ending March 31, 1922. Applications should be addressed to the Officer-in-Charge of Stores, Ordnance Survey Office, Southampton.

Machinery was damaged and a large quantity of unfinished dye was destroyed by a FIRE IN THE PURIFYING BUILDING of the British Alizarine Co., Ltd., on April 7. Three motor pumps were in attendance and the outbreak was quickly overcome. The cause of the outbreak is at present unknown.

Mr. MAX MUSPRATT, chairman of the United Alkali Co., Ltd., has been elected an alderman of the City of Liverpool. He is a justice of the peace for the county of Lancashire and has been a member of the Liverpool City Council almost continuously since the end of 1903.

The Council of the University of Manchester has invited PROFESSOR EINSTEIN to give a lecture at the University during his visit to England in the near future. Professor Einstein has written to express his pleasure in accepting the invitation. The date and hour of the lecture are not yet settled.

The Reval branch of the Swedish Ageo-Lux is building an ACETYLENE GAS GENERATING FACTORY IN RIGA for the purpose of furnishing the needs of the marine department. A special department for the manufacture of oxygen will be attached to the factory, and the company also intends to make provision for a department for the testing and refining of ores.

The meeting to inaugurate the Institute of Physics will take place on April 27 at 6 p.m. in the Hall of the Institution of Civil Engineers, Great George Street, Westminster. Sir Richard Glazebrook, President, will preside, and Sir J. J. Thomson will deliver an address. Non-members of the Institute or of the societies associated with it may obtain tickets of admission on application to the Secretary, 10, Essex Street, Strand, W.C.2.

At the annual dinner of the Institution of Mining and Metallurgy held on Wednesday in the Edward VII. Rooms, Hotel Victoria, Mr. Frank Merricks, who presided, announced that an arrangement had been arrived at for closer co-operation between that Institution and the Institution of Mining Engineers, which he hoped might in time lead to the LINKING UP OF THE MINING INSTITUTIONS of the Empire in an Imperial Federation.

It is reported from Berlin that the aniline combine, consisting of the Badische Aniline Company, the Friedrich Bayer and Hoechster Companies, and the four other largest chemical corporations in Germany, proposes to increase its capital with a view to EXTENDING THE NITRE WORKS AT LEUNA, Central Germany, in order to increase the daily output of artificial nitre by 200 tons, which at present turn out daily 400 tons of artificial nitre. The present capital of the combine is stated to be 1,211,400,000 marks.

In the course of a paper on THE THEORY OF CELLULOSE SOLVENTS read by Mr. H. E. Williams at a meeting of the Manchester Literary and Philosophical Society on Tuesday, the lecturer said that for an aqueous solution of a neutral salt to dissolve cellulose it must consist of a liquid hydrate—an associated molecular complex of salt and water. This complex must be of such an order that it had a viscosity above a certain minimum and a positive heat of dilution between well defined limits.

Mr. JOHN WALKER LEITCH, of the firm of John W. Leitch & Co., died on Sunday last at Somerville Edgerton, in his 57th year. In 1887 he was appointed secretary and chief chemist with Dan Dawson Brothers, Ltd. (Colne Vale Dye and Chemical Works), and three years later founded the present business. He was a governor of the Langwood Grammar School and a member of the Technical College Coal-tar Extension Committee. He leaves a widow, one son, Mr. Donald Leitch, and three daughters.

It has been stated that the State Department at Washington is attempting to come to an agreement with the GERMAN KALI SYNDICATE for a reduction of price of 45 per cent. upon the basis of a five years' contract. The American Diplomatic Representative in Berlin, Mr. Dresel, is said to be in communication with the Kali Syndicate, which demands that the American Fertiliser Manufacturers' Association shall undertake to purchase 80 per cent. of the entire German kali production. Negotiations are stated to be progressing rapidly.

In the course of a lecture on Science and Disarmament delivered before the Delaware section of the American Chemical Society, Dr. Bogart declared that in order to cope successfully with a nation having such skill in chemistry as has Germany, it would be necessary to have A WELL-DEVELOPED CHEMICAL WARFARE SERVICE. The speaker was of the opinion that chemical warfare was yet in its infancy, and that after it had run its course the military art might also invoke medical and biological warfare, which could be done by the dissemination of germs and disease. He, therefore, maintained that the military efficiency of the future would depend in large measure upon science.

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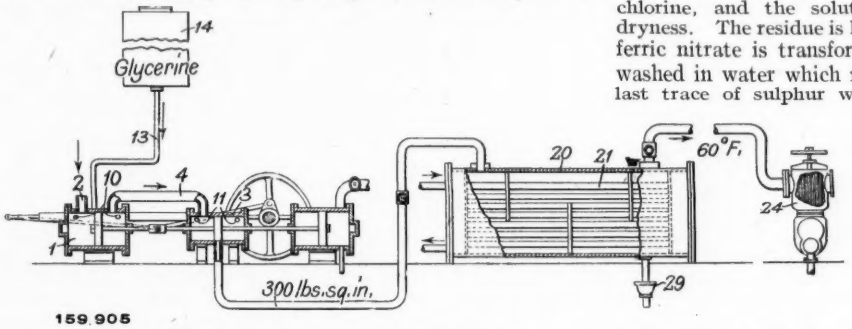
159,905. ILLUMINATING AND OTHER GASES, PURIFICATION OF.—W. O. Felt, 1,078 E., 15th Street, Brooklyn, New York. Application date, September 22, 1917.

Gas is admitted by the pipe 2 to the low-pressure cylinder 1 of a 2-stage compressor, which delivers it through the pipe 4 to the high-pressure cylinder 3, where it is compressed to about 300 lb. per square inch. Glycerine from the tank 14 is delivered through a pipe 13 to openings 10, 11 in both cylinders



159,905

and prevents a material rise of temperature in the gas. The mixture of gas and glycerine passes to a condenser 20 cooled by water tubes 21 and the temperature is reduced to about 60°F. Some of the glycerine is condensed and removed through the trap 29, and the remainder passes in suspension to an extractor 24, which removes the glycerine and the contained impurities. Gaseous impurities such as ammonia, carbon dioxide, and hydrogen sulphide, are absorbed by the glycerine under pressure and released when it is drawn off and the pressure removed. Salts such as ammonium carbonate or sulphate remain in solution in the glycerine and may be precipitated by concentrating it.

159,908. DISTILLATION FURNACES. G. Heeley, 32, Rue Grange, Aux Belles, Paris. Application date, September 18, 1919.

A number of parallel vertical retorts for distilling coal are arranged in a setting and are each heated by flues on either side in the dividing walls. A regenerator is arranged below the retorts with its horizontal flues perpendicular to the length of the retorts. The uppermost flues are each in communication with all the combustion or heating flues, so that the whole regenerator is kept in operation when one or more of the retorts is out of action. The gas and air for combustion are passed through flues in the regenerator on each side of the waste-gas flue, and are delivered to the bottom of the combustion chambers adjacent to the retorts.

159,925. PULVERISING OR FINE GRINDING, PROCESS AND APPARATUS FOR. F. Seymour, 55, Prospect Street, East Orange, N.J., U.S.A. Application date, November 7, 1919.

The apparatus is for pulverising friable material such as coal or coke to an extent sufficient for combustion in suspension in air, *i.e.*, so that 85 per cent. will pass through a screen having 200 meshes per linear inch. A number of cylindrical chambers are arranged co-axially, and each is provided with beaters mounted on a disc carried by a common co-axial shaft. The chambers are separated by partitions having a large central opening, and the diameter of the chambers increases successively from one end of the series to the other. The material is admitted to the smallest chamber and passes in a current of air through the chambers in succession. The diameter of the disc carrying the beaters is substantially less than the central opening in the smallest chamber, but this difference gradually decreases towards the other end of the series. The material is thus carried along by a tubular air current which is unobstructed at the beginning of the pulverising action but becomes undulating towards the end. The undulations of the air current ensure that only the finer portion of the material is carried out of the apparatus, while the coarser particles are deflected into the successive beaters for further treatment.

159,960. CATALYTIC IRON OR CATALYSTS CONTAINING CATALYTIC IRON, PROCESS FOR THE MANUFACTURE OF. The Nitro-Fixation Syndicate, Ltd., and H. C. Jenkins, Salisbury House, London, E.C.2. Application date, December 5, 1919.

The object is to obtain iron of great purity. A solution of ferric nitrate is freed from compounds of phosphorus and arsenic by fractional precipitation with ammonia, and the exact amount of silver nitrate is then added to precipitate all chlorine, and the solution is filtered and evaporated to dryness. The residue is heated to such a point that part of the ferric nitrate is transformed into oxide, and the product is washed in water which removes the residual nitrate and the last trace of sulphur which is present as soluble oxidised products. The residue is ignited, reduced by hydrogen, and then treated with ammonia gas at 500°C. If a promoter such as ammonium molybdate, potassium osmate, titanium nitrate or uranium nitrate is also required, this compound may be added to the purified ferric oxide before reduction. The catalyst thus made is particularly suitable for the synthesis of ammonia.

159,987. VULCANISED RUBBER, PROCESS FOR DEVULCANISING. C. F. Willard, 920, 8th Street, San Diego, Cal., U.S.A. Application date, December 9, 1919.

Vulcanised rubber is ground and boiled with wood, coal, or gas tar, rosin, pitch, resins, gums or balsams, and a sulphur solvent such as turpentine, under steam pressure of 3-7 atmospheres. The wood tar and the like, and sulphur, are then removed from the rubber by means of a boiling 3 per cent. solution of caustic soda. The theory of the process in terms of colloidal chemistry is discussed in considerable detail.

160,114. OIL FROM OLEIFEROUS SANDSTONE, SHALE OR THE LIKE, APPARATUS FOR THE EXTRACTION OF. T. H. Oswald and A. D. Dixon-Brown, 87, Bishopsgate, London, E.C. Application date, July 7, 1920.

The raw material is treated in a horizontal or inclined rotating chamber through which superheated steam is passed in the reverse direction. The material is charged from a hopper into one end of the distilling chamber by means of a co-axial helical conveyor and is agitated within the distilling chamber by means of radial ribs. The residual material is discharged at the other end by a similar co-axial conveyor which delivers it into a water seal. The superheated steam is supplied through the hollow shaft of the discharge conveyor.

NOTE.—The following specifications which are now accepted were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention: 127,549 (Soc. Industrielle de Produits Chimiques), relating to recovery of ammonia from coke-oven gases, *see* Vol. I., p. 229; 136,141 (O. Carlsson and E. Thall), relating to reducing viscosity of nitrocellulose solutions, *see* Vol. II., p. 184; 145,599 (H. Cramm), relating to grinding mills, *see* Vol. III., p. 293; 147,000 (Farbverke vorm. Meister Lucius & Bruning), relating to pyridine bases, *see* Vol. III., p. 382.

International Specifications not yet Accepted

157,745. AMMONIA. P. Brat, 112, Haupstrasse, Oldenburg, Germany. International Convention date, October 21, 1918.

Peat is heated with lime in a closed vessel under six atmospheres pressure, and ammonia is evolved. Heating is continued till the residue contains 10-15 per cent. of water and brown coal tar pitch having a boiling point of 300° C. is added. If this mixture is distilled at 300°-350°C., hydrocarbon oils are obtained.

157,793. BENZOL, RECOVERING FROM WASH-OILS. F. Raschig, 52, Mundenheimerstrasse, Ludwigshaften-on-Rhine, Germany. (Assignee of A. Hartmann, 21a, Levetzowstrasse, Berlin.) International Convention date, November 13, 1913.

Oils used for washing coke oven gas are distilled by steam

coils at about 150°C. and a pressure of 0·1 atmosphere to recover benzol.

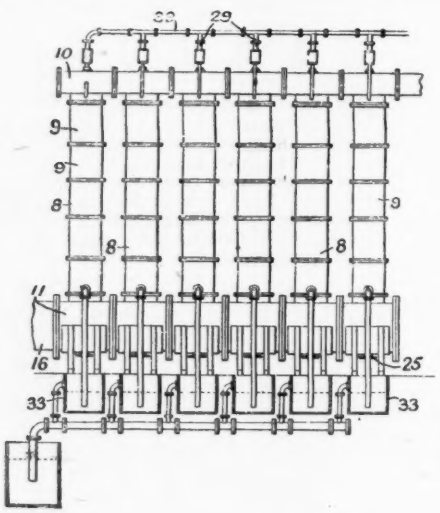
157,794-5. BROWN COAL AND PEAT. K. Jacobs, 21, Astertor, Hamburg, Germany. International Convention date, July 28, 1919.

157,794. Brown coal or peat is partly dried and then heated to about 250°C. to remove water and carbon dioxide. An exothermic reaction occurs, and heating is continued up to 290°-350° to distil off low-temperature tar. The product is a long-flame fuel. The yield of by-products may be increased by heating internally with superheated steam.

157,795. Brown coal or peat is dried and then heated in a vessel with open outlet until distillation of tar commences. The outlet is then closed and the heating continued under pressure. The product is a semi-coke.

157,828. BY-PRODUCT CONDENSERS. American Coke and Chemical Co., 208, South La Salle Street, Chicago. (Assignees of A. Roberts, 208, South La Salle Street, Chicago.) International Convention date, April 17, 1915.

A number of column units 8 are built up from sections 9 and are connected to a common inlet main 11 and outlet main 10. The supply of gas to each column is separately controlled by valves 25, and the ascending gas is treated with a spray of



157,828

oil or emulsion which evaporates and regulates the temperature to the point required to condense any given constituent of the gas. The oil sprays are supplied from a common pipe 38, and the regulating valves in the branch pipes 29 are operated by a compressed air device which is controlled by the temperature existing at the top of the column.

157,849. DISTILLING MATERIALS OF HIGH BOILING POINT. Chemische Fabriken Worms Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. International Convention date, August 6, 1917.

A number of horizontal stills are arranged parallel to one another in a setting, and each is provided with a U-shaped tube within it for heating the liquid. All the tubes are connected to passages in the setting which are controlled by dampers in such a way that flue gases may be passed through them separately or in series.

157,850. OXYALDEHYDES. H. Haakh, 7, Herzog Friedrich Ring, Dessau, Anhalt, Germany. International Convention date, February 6, 1918.

Phenols or their derivatives are treated with formaldehyde, a nitroso compound such as nitrosodimethylaniline, nitrosodiethylaniline, or nitrosophenol, and an acid condensing agent such as hydrochloric acid. Particulars are given for preparing salicylic aldehyde, *p*-oxybenzaldehyde, 2-oxy-5-methyl-benzaldehyde, anisic aldehyde, vanillin, protocatechnic aldehyde, and aldehyde from 2-naphthol-3 : 4-disulphonic acid.

157,851. SYNTHETIC TANNING AGENTS. Chemische Fabriken Worms Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. International Convention date, February 1, 1917.

A tanning agent is produced by sulphonating a mixture of naphthalene and phenol and condensing with formaldehyde solution. The product is diluted, neutralised with lime, and filtered.

157,852. SYNTHETIC TANNING AGENTS. Chemische Fabriken Worms Akt.-Ges., 28, Mainzerlandstrasse, Frankfurt-on-Main, Germany. (Assignees of Chemikalienwerk Griesheim Ges., Gresheim-on-Main, Germany). International Convention date, May 31, 1916.

The components of tar oils are coupled by appropriate elements without isolation of the components, and acid groups are introduced before or after coupling to solubilise the products. Tar oil may be heated with phosphorus pentoxide and strong sulphuric acid and then neutralised with alkali; or a tar oil may be sulphonated and then condensed with sulphur monochloride or formaldehyde and neutralised. Other examples are given.

157,855-6. SYNTHETIC TANNING AGENTS. Chemische Fabriken and Asphaltwerke Akt.-Ges., Griesheim-on-Main, Germany. International Convention dates, June 21, 1916 and July 17, 1916.

157,855. The process is similar to that of 157,852 above. Tar oil is sulphonated, made alkaline with caustic soda, sodium carbonate or lime, and condensed with formaldehyde.

157,856. Tar oil is sulphonated, converted through the calcium salt into the sodium salt, and subjected to alkali fusion. The phenol produced is heated with phosphorus pentoxide and sulphuric acid and then neutralised with alkali. Other examples are also given.

157,860. ZINC WHITE. C. Clerc, 29, Rue d'Astorg, Paris, and A. Nihoul, 29, Passage des Favorites, Paris. International Convention date, November 15, 1919.

Zinc ore or other product is dissolved in hydrochloric acid, the solution purified, and magnesia or magnesium carbonate added. Carbon dioxide is passed through the mixture to precipitate zinc carbonate and produce magnesium chloride solution. The latter is filtered off and magnesia added to produce the oxychloride which may be heated to produce hydrochloric acid and magnesia for use again. The zinc carbonate may be calcined or treated with caustic soda to produce the oxide. Zinc sulphide may be obtained from the solution of the zinc oxide in acetic acid, or by treating the carbonate with sulphuretted hydrogen.

157,871. ELECTROLYSIS. Chile Exploration Co., 120, Broadway, Manhattan, New York. (Assignees of C. G. Fink, 1, Leighton Avenue, Yonkers, New York). International Convention date, January 21, 1920.

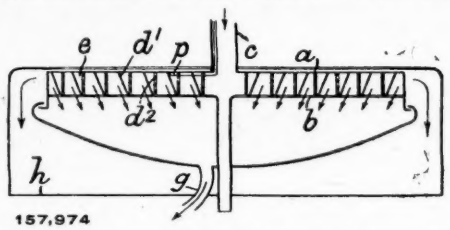
An anode for use in electrolysing copper sulphate solutions consists of an alloy of cobalt and silicon, with the addition of manganese to facilitate disengagement of electrolytic oxygen, and a hardening metal such as chromium, tungsten, molybdenum, or uranium.

157,879. BARIUM CHLORIDE. Mathieson Alkali Works, Inc., 25, West Forty-third Street, New York. (Assignees of J. H. MacMahon, Saltville, Virginia, U.S.A.). International Convention date, January 20, 1920.

Barytes is reduced with coal dust and the barium sulphide treated with ammonium chloride to produce barium chloride. "Feeder liquor" from the ammonia soda process is supported to the top of a still and exhaust steam is passed in at the bottom. Ammonium carbonate is driven off and the solution of ammonium and sodium chlorides passes to an evaporator, where sodium chloride is deposited. Ammonium chloride is recrystallised to purify it, and passed to another still which also receives barium sulphide solution from tanks in which black ash is lixiviated. The liquor then passes to an evaporator and crystalliser, in which barium chloride crystallises. The liquor is previously treated with steam to remove ammonium sulphide which is absorbed in caustic soda in another still and then treated with steam to recover the ammonia for use in the ammonia-soda process.

157,974. CENTRIFUGAL SEPARATORS. A. J. M., Rialland, 25, Rue Mansard, Versailles, France. International Convention date, April 30, 1919.

The rotating element of a centrifugal separator comprises two parallel plates *a*, *b*, having spiral passages between them extending from the centre to the periphery. Liquid is supplied



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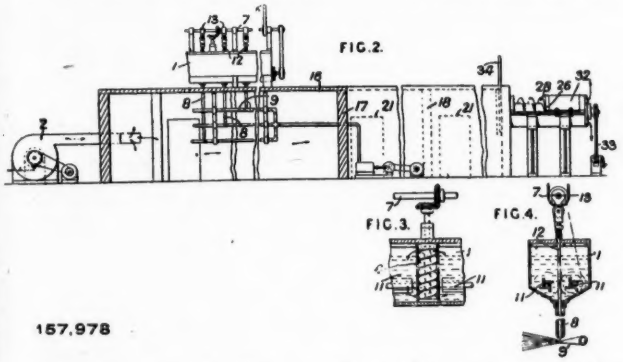
through the pipe *c*, passes through the perforated walls d^2, and is deflected by the unperforated walls *d'* through the plate *b* to the outlet. Solid particles pass on to the periphery and thence into the vessel *h*.

157,975-8. COAGULATING RUBBER LATEX. E. Hopkinson, 1790, Broadway, New York. International Convention date, January 16, 1920.

157,975. Ammonia is added to rubber latex to prevent premature coagulation and the latex is then sprayed into a current of air or carbon dioxide heated to 200°F. Sulphur or other vulcanising agents are added to the latex before coagulation, in which case the preservative is preferably saponin, glycerine, or glue.

157,978. Rubber latex is agitated in a tank 1 by stirring devices, 4, 11, and is then sprayed into a chamber 16 from nozzles 8 by air pressure. The shaft 7 drives the stirring devices and also reciprocates rods 12 to keep the nozzles clear. Air or carbon dioxide is heated to 200°F. and is blown by a



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pump into the chamber 2. Part of the coagulated latex is trapped by the baffle plates 17, 18, and the remainder by helical baffles 28 in cylinders 26. The baffles 28 are rotated by gearing 33 during removal of the rubber from them.

157,984. TIN AND ANTIMONY COMPOUNDS. H. B. Bishop, 101, Park Avenue, New York. (Assignee of G. W. Mullen, Easton, Pa., U.S.A.). International Convention date, January 14, 1920.

White metal mattes, tin ore, slags or other tin-bearing materials are heated in a reverberatory furnace with nitre cake to convert the metals into sulphides. The product is leached with water, when thiostannates and thioantimonates are dissolved, leaving copper and lead sulphides. The solution is electrolysed to recover antimony, and then acidified to convert the tin into sulphide, which is then roasted and reduced.

LATEST NOTIFICATIONS

161,143. Apparatus for storing and distributing liquids. Racine, P. F. A. April 2, 1921.

161,152. Automatic temperature alarm device. Schmidheiny, J. March 30, 1920.

161,156. Manufacture of French oxide. New Jersey Zinc Co. March 31, 1920.

161,159. Manufacture for leaching materials. Soc. Generale D'Evaporation Procédés Prache et Bouillon. March 30, 1920.

161,160. Rotary pumps. Soc. Anon Pour L'Exploitation Des Procédés M. Leblanc-Vickers. March 30, 1920.

161,161. Method of producing ammonium chloride in combusting or distilling alum slate or similar bituminous shales. March 27, 1920.

161,165. Manufacture of magnesium chloride. Goldschmidt, V. M. March 29, 1920.

161,169. Process of and apparatus for the manufacture of soap. Paley Engineering Co. April 1, 1920.

160,815. Process for suppressing upper harmonic anode currents in metal vapour rectifiers feed through polyphase transformers. Akt. Ges. Brown, Bouverie. et Cie. April 1, 1920.

160,810. Manufacture of fertilisers. Soc. L.Azote Français. March 29, 1920.

160,811. Synthesis of ammonia. Soc. L'Air Liquide (Soc. Anon. Pour L'Etude et L'Exploitation Des Procédés. G. Claude). March 30, 1920.

160,833. Process for processing the higher harmonic currents in the secondary circuit of polyphase metal vapour rectifiers fed through transformers. Akt.-Ges. Brown, Bouverie et Cie. April 1, 1920.

160,840. Manufacture of nutritious fats, especially of butter-fat and lard. Schicht. Akt. Ges. G. and Grun. A. April 1, 1920.

161,175. Synthetically-produced hydro-carbon oils. Brownlee, R. H. May 13, 1918.

Specifications Accepted, with Date of Application

137,064. Valeric acid and alkaline valerates, Process for the manufacture of. Darrasse Freres et Cie. December 3, 1918.

139,195. Aluminium nitride, Manufacture of. V. Gerber. February 18, 1919.

145,071. Phthalic anhydride, Manufacture and production of. A. Wohl. June 28, 1916.

145,408. Tar of aliphatic compounds or low temperature tar, Method for producing. G. A. Pestalozzi. June 20, 1919.

145,514. Plastic masses, Process for the manufacture of—and new industrial products obtained therefrom. L. Gauthier (née Verot). April 18, 1919. Addition to 128,905.

145,614, 155,575-6. *p*-aminophenol and its *o*-alkyl ethers, Manufacture of derivatives of. E. Kolshorn. June 13, 1919, and December 12, 1919. The two latter additions to 145,614.

160,477. Ores and the like, Roasting and sintering of. R. L. Lloyd. September 4, 1919.

160,556. Lime, Apparatus for the hydration of—and for similar purposes. E. R. Sutcliffe. December 22, 1919.

160,561. Carbon, Production of pure. F. C. Dyche-Teague. December 23, 1919.

160,625-6-8. Coke ovens. G. B. Ellis. (*Foundation Oven Corporation.*) January 29, 1920, and January 30, 1920.

Applications for Patents

Bailey, A. W. Manufacture of celluloid pumps. 10,110. April 6.

Baty, E. J. Process of gas purification. 9,868. April 4.

Bowen, R. Production of artificial fuel. 10,409. April 8.

British Glass Industries, Ltd. Bottles. 10,421. April 8.

Cutler-Hammer Manufacturing Co. and Igranic Electric Co., Ltd. Measuring calorific value of combustible gases, &c. 10,302, 10,303. April 7.

Dehn, F. B. (Satow). Manufacture of insoluble condensation product. 10,214. April 6.

Ebbw Vale Steel, Iron & Coal Co., Ltd. Neutralising and drying sulphate of ammonia. 10,482. April 9.

Falkner, G. F. Printing. 9,839. April 4.

Farbwerke vorm. Meister, Lucius & Brüning. Manufacture of x-dialkylaminoethyl-β-aracyl oxybutric acid esters. 10,508. April 9. (Germany, April 10, 1920.)

Gail, J. B. Removing oil from condensation waters. 10,310. April 7. (France, April 15, 1920.)

Haddan, P. (Jenny). Process for converting organic acids into esters. 9,927, 9,928. April 4.

Jenny E. Zollinger. Process for converting organic acids into esters. 9,927, 9,928. April 4.

Kerr, R. P. Gas purification. 10,230. April 7.

La Coart, A. F. de. Devices for vapourising liquid fuel of slow volatilisation. 9,983. April 5. (Italy, April 13, 1920.)

Lo Monaco, D. Chemical fertilisers. 10,315. April 7.

Marks, E. C. R. (*Pfirschinger Mineralwerke Geb. Wildhagen & Falk*). Process for increasing bleaching power of silicates. 10,157. April 6.

Pallett, F. Ignition carrier for acetylene, &c., lamps. 10,075. April 6.

Passmore, F. W. Manufacture of magnesium salts. 10,493. April 9.

Plauson, H. Process for manufacture of paste or salves from mineral, &c., oils. 10,084. April 6.

Rhenania Verein Chemischer Fabriken Akt.-Ges., formerly Verein Chemischer Fabriken Mannheim. Manufacture of sulphurous acid. 10,489. April 9. (Germany, April 14, 1920.)

Scholey, H., and Shorter, A. E. Acetylene apparatus. 10,426. April 8.

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, APRIL 14.

The market is completely overshadowed by the impending industrial troubles, and whilst there is a better tendency, generally speaking, there is little hope offered until more settled labour conditions prevail.

There is little change to be noted in the export position.

General Chemicals

ACETONE has been in considerable enquiry, and the price is firmer.

ACID ACETIC is only in small demand, but the tendency is harder on account of restricted continental competition.

ACID CITRIC is unchanged.

ACID FORMIC is in steady demand, but buying remains of the hand to mouth variety; the price is firmer.

ACID OXALIC fully maintains the recent advance, but is rather slow of sale.

ACID TARTARIC shows no improvement in price. Realisation sales are still in evidence.

BLEACHING POWDER is in very poor demand, and continental parcels are offered at very low figures.

COPPER SULPHATE continues on the down grade, and orders remain very scarce.

FORMALDEHYDE is firmer in tone, and stocks appear to be very much reduced.

LEAD ACETATE remains in better enquiry, but the price is still unattractive.

POTASH BICHROMATE remains a drug on the market, and second-hand realisations are reported at very low prices.

POTASH CAUSTIC.—Whilst the general conditions governing the supply would appear to justify an increase in price, the lack of demand leaves the article in an unsatisfactory position.

POTASH PRUSSIATE is still in very small enquiry, but stocks are firmly held.

SODA ACETATE is expected to improve somewhat in sympathy with acetic acid, and stocks are passing steadily into consumption.

SODA BICHROMATE remains very weak, again owing to forced realisation. At the moment the price does not seem to bear a proper relation to intrinsic value.

SODA CAUSTIC is practically without a market.

SODA HYPOSULPHITE is in moderate demand; price unchanged.

SODA NITRITE is only in small demand, but the price is firmer.

SODA PRUSSIATE is not in good demand, and the price is easy.

Coal Tar Intermediates

There is very little change to report in this section, the market generally being almost lifeless.

ANILINE OIL AND SALT are only in very small request.

BETA NAPHTHOL has met with slightly better enquiry, but the actual business placed is small.

DINITROPHENOL is required on export account, and the price is steady.

NAPHTHIONATE OF SODA continues in request at recent quoted prices.

NITRO BENZOL is slightly firmer, with fair demand.

SALICYLIC ACID is firm, with good enquiry for the B.P. material.

Coal Tar Products

There is very little change in the condition of the market for Coal Tar Products from last week. Supplies of one or two products are becoming scarcer owing to tar distillers being short of supplies of crude tar.

90's BENZOL is quoted at 2s. 10d. on rails in the North and 3s. in the South.

PURE BENZOL is worth 2s. 11d. on rails in the North, and 3s. 1d. to 3s. 2d. in the South.

CREOSOTE OIL is quoted at 8d. to 8¼d. on rails in the North, and at 9¼d. to 9½d. in the South.

CRESYLIC ACID is still very weak, and is worth about 2s. 6d. for the Pale quality, and 2s. 3d. to 2s. 4d. per gallon for the Dark quality.

SOLVENT NAPHTHA is quoted at 1s. 11d. to 2s.

HEAVY NAPHTHA is worth 2s. 2d. on rails.

NAPHTHALENE is inactive at from £9 to £14 per ton for Crude and £20 to £25 for Refined.

PITCH.—Owing to the coal strike the market is unsettled; business is slow and prices are irregular.

SULPHATE OF AMMONIA is unchanged. The demand for the home trade is fairly steady.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	6	to	0	2	9
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	95	0	0	to	100	0	0
Acid, Acetic, glacial, 99-100%	ton	70	0	0	to	72	0	0
Acetic, 80% pure	ton	53	0	0	to	54	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst	ton	69	0	0	to	70	0	0
Carbolic, cryst. 39-40%	lb.	0	0	9	to	0	0	9½
Citric	lb.	0	2	4	to	0	2	6
Formic, 80%	ton	80	0	0	to	85	0	0
Gallic, pure	lb.	0	4	9	to	0	5	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	37	10	0	to	40	0	0
Lactic, 60 vol.	ton	42	10	0	to	45	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	0	10	to	0	0	11
Phosphoric, 1.5	ton	55	0	0	to	57	0	0
Pyrogallic, cryst	lb.	0	8	9	to	0	9	0
Salicylic, Technical	lb.	0	1	0	to	0	1	2
Salicylic, B.P.	lb.	0	1	6	to	0	1	9
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	1	9	to	0	1	10
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	45	0	0	to	50	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	13	0	0	to	14	0	0
Aluminium, sulphate, 17-18%	ton	15	5	0	to	16	0	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	4	to	—		
Ammonia, chloride	ton	65	0	0	to	70	0	0
Ammonia, muriate (galvanisers)	ton	55	0	0	to	57	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	95	0	0	to	100	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	55	0	0	to	60	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	20	0	0	to	21	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	30	0	0	to	31	0	0
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	20	0	0	to	21	0	0
Borax crystals	ton	34	0	0	to	36	0	0
Calcium acetate, Brown	ton	12	0	0	to	13	0	0
,, Grey	ton	19	0	0	to	21	0	0
Calcium Carbide	ton	29	0	0	to	30	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	90	0	0	to	92	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4

	per	£	s.	d.		£	s.	d.
Cobalt acetate	lb.	0	11	6	to	0	12	6
Oxide, black	lb.	0	16	0	to		—	
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	35	0	0	to	37	0	0
Cream Tartar, 98-100%	ton	140	0	0	to	150	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	120	0	0	to	122	10	0
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1
Glauber salts, commercial	ton	6	0	0	to	7	0	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	50	0	0	to	52	0	0
Carbonate (White Lead)	ton	43	0	0	to	46	0	0
Nitrate	ton	55	0	0	to	57	0	0
Litharge	ton	38	10	0	to	40	0	0
Lithopone, 30%	ton	30	0	0	to	32	10	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	10	10	0	to	11	10	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	75	0	0	to	78	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	ton	145	0	0	to	150	0	0
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potash, Caustic	ton	50	0	0	to	55	0	0
Potassium bichromate	lb.	0	0	9½	to		—	
Carbonate, 90%	ton	55	0	0	to	60	0	0
Chloride	ton	38	0	0	to	40	0	0
Chlorate	lb.	0	0	8½	to	0	0	9
Meta bisulphite, 50-52%	ton	200	0	0	to	210	0	0
Nitrate, refined	ton	50	0	0	to	52	0	0
Permanganate	lb.	0	2	0	to	0	2	3
Prussiate, red	lb.	0	2	6	to	0	2	9
Prussiate, yellow	lb.	0	1	6	to	0	1	7
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	3	15	0	to		—	
Seconds	cwt.	3	10	0	to		—	
Sodium acetate	ton	35	0	0	to	37	10	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	7½	to	0	0	8
Bisulphite, 60-62%	ton	37	10	0	to	40	0	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	0	0	to	25	10	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	22	0	0	to	24	0	0
Nitrite, 96-98%	ton	50	0	0	to	52	0	0
Phosphate, crystal	ton	25	0	0	to	27	0	0
Perborate	lb.	0	1	9	to	0	2	0
Prussiate	lb.	0	0	8½	to	0	0	9
Sodium Sulphide, crystals	ton	20	0	0	to	23	0	0
Sulphide, solid, 60-62%	ton	40	0	0	to	41	0	0
Sulphite, cryst.	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Strontium Nitrate	ton	90	0	0	to	95	0	0
Strontium Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	2	3	to	0	2	6
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb.	0	1	8	to	0	1	9
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	45	0	0	to	47	10	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	4	6	to	0	4	9
Alphanaphthylamine	lb.	0	3	0	to	0	3	3
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	4	9	to	0	5	0
Benzidine, base	lb.	0	11	6	to	0	12	0
Benzidine, sulphate	lb.	0	10	0	to	0	10	6
Benzoic acid	lb.	0	2	3	to	0	2	6
Benzoate of soda	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	8	0	to	0	8	6
Betanaphthol	lb.	0	3	0	to	0	3	3
Betanaphthylamine, technical	lb.	0	9	6	to	0	10	0
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	3	0	to	0	3	3
Dimethylaniline	lb.	0	5	0	to	0	5	3
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	10	0	to	0	10	6
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	0
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	5	0	to	0	5	6
Nitronaphthalene	lb.	0	1	6	to	0	1	8
Nitrotoluol	lb.	0	1	4	to	0	1	5
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor	lb	0	13	0	to	0	13	6
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	5	9	to	0	6	0
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	3	to	0	8	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
Resorcin, technical	lb.	0	7	6	to	0	8	6
Resorcin, pure	lb.	0	8	9	to	0	9	0
Salol	lb.	0	3	6	to	0	3	9
Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9
Tolidine, base	lb.	0	8	6	to	0	10	0
Tolidine, mixture	lb.	0	2	9	to	0	3	0

Cardiff By-Products

	CARDIFF, APRIL 13.
Sulphate of Ammonia—	
For home consumption (per ton o.t.)	£24 11s. od.
For export (per ton f.o.b.)	£20 to £30
National Benzole (per gallon)	3s. to 3s. 6d.
Motor Benzol (per gallon)	3s. to 3s. 5d.
Crude Benzol (per gallon)	1s. 9d. to 2s.
Solvent Naphtha (per gallon)	2s. 5d. to 2s. 7d.
Heavy Naphtha (per gallon)	2s. 9d. to 2s. 11d.
Crude Naphthalene Salts (per ton)	£9 to £15
Pitch (per ton)	80s. to 100s.
Creosote (per gallon)	10d. to 11d.

LEVER BROTHERS.—The report for the year 1920 states that the balance of £3,270,091 standing to credit of profit and loss, after providing for repairs, renewals and alterations, depreciation and insurance, has been appropriated as follows: Dividends on 7 per cent. preference, £1,401,872; 8 per cent. "A" preference, £756,611; 20 per cent. preferred ordinary, £300,000; 20 per cent. "B" preferred ordinary, £37,879; 5 per cent. preferred ordinary, £35,938; co-partnership dividends, £276,855; dividend on ordinary at rate of 20 per cent. per annum, £456,000; carried to reserve, £4,936. During the year, and in particular towards its close, there has been very severe depression in trade, involving heavy falls in the values of properties and interests in West Africa and the Philippine Islands belonging to some of the associated companies. After careful consideration of the value of the whole of the assets of the company, the directors are satisfied that all depreciations in value are covered by the appreciated values of the holdings of the company in other associated companies, after providing out of such appreciated value the sum of £3,930,518 capitalised on July 1 last, and at that time set against reserves now replaced. The special reserve and contingency reserves, part of the replaced reserves, has been set off against the fall in value of stock and expenses of issues of capital. Credit has been taken in the accounts for a large claim against the Government in respect of excess profits duty. Meeting, the Lyceum, Port Sunlight, Cheshire, April 22, at 11.30 a.m.

Company News

CANADIAN EXPLOSIVES.—A dividend of 1¾ per cent. on the 7 per cent. cumulative preferred shares for the quarter to March 31 was paid on April 15 to holders registered on March 31.

THE NIGER CO., LTD.—Lazard Brothers & Co., Ltd., announce that after April 15 the endorsement of the company's 8 per cent. Seven Year Notes will continue to be effected through them, but only at the offices of Lever Brothers, Port Sunlight.

NITRATE RAILWAY CO.—The directors recommend a final dividend of 7s. per share, less income tax, on the preferred consolidated ordinary shares, making a total maximum dividend for 1920 of 7 per cent. and a final dividend of 7s. per share, less income tax, on the ordinary (unconverted) shares, making 7 per cent. for the year.

SALT UNION.—The accounts for 1920 show that the net profit was £317,367, and £24,007 was brought in, making £341,374. Dividends of 11⅝ per cent. on the preference shares and 15 per cent. on the ordinary shares are notified, and the grant to the benevolent fund has been increased to £20,000. £50,000 is placed to contingencies account, leaving to be carried forward £23,274.

UNITED ALKALI.—The directors submit accounts for 1919, but are not yet able to submit them to December 31, 1920. They are satisfied that the preliminary accounts justify the final dividend on the preference shares and the dividend already paid of 1s. per share on the ordinary shares, less income tax, already paid. The directors much regret they cannot recommend any further ordinary dividend, although the preliminary accounts indicate that the results of the manufacturing operations during 1920 have been highly satisfactory. They are influenced by the necessity of conserving finances in connexion with expenditure upon plant, absorption of working capital by abnormal cost of wages and materials, and burdensome taxation. The accounts for 1919 show a profit of £178,850, and £88,282 was brought forward from 1918. After providing for the dividends, £65,696 was carried forward to 1920. Meeting, 14, Cook Street, Liverpool, April 20, at 2 p.m.

BRUNNER, MOND.—The directors have issued notices convening special meetings of shareholders for April 21 and May 6 for the purpose of passing resolutions to alter the articles of association to bring them into line with modern requirements; to subdivide the existing 150,000 £10 preference shares into 10 shares of £1 each; to increase the rate of interest thereon to 7½ per cent. per annum; and to put the company in a position to take advantage of the statutory power to pay underwriting commission on an issue of shares. These alterations are being proposed in view of the directors' intention to issue in the near future 2,500,000 7½ per cent. preference shares of £1 each, ranking *pari passu* with the already issued 150,000 preference shares of £10 each, which by the alteration will become 1,500,000 7½ per cent. preference shares of £1. The company will then have an issued capital of £4,000,000 in ordinary shares. Upon the issue being made preference in allotment will be given to existing shareholders.

MOND NICKEL.—A Stock Exchange announcement states that dealings in £1,300,000 8 per cent. mortgage debenture stock, provisional scrip, fully and partly paid, have been specially allowed by the Committee under Temporary Regulation 4 (3). These securities will rank *parri passu* with those in which special settling days have already been appointed, as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted as soon as they are identical and are officially quoted. Although it was intended to keep the subscription list open until April 11, B.S.T., Ltd., announced that as the offer for the sale of the £1,300,000 8 per cent. mortgage debenture stock of the Mond Nickel Co., Ltd., had been largely oversubscribed, the list was closed on April 7. Allotment letters in connection with the recent issue were posted on Wednesday night. The applications were accepted on the following basis: Up to £200 in full, approximately 50 per cent. to applicants for £500 and upwards, and to applicants for amounts between £200 and £500 an intermediate allotment, with a slight advantage to the smaller applicants.

BRITISH PORTLAND CEMENT.—At the tenth ordinary general meeting of the British Portland Cement Manufacturers, Ltd., held on Tuesday, the chairman (Brig.-General the Hon. F. C. Stanley) pointed out that the balance of profit brought forward from the previous year of £136,264 was subject to any liability for excess profits duty at that date, whereas they were carrying forward £181,477 as at December 31 last, an increase of £45,213, and that this result had been obtained after charging against the profits an amount estimated to cover all liability for excess profits duty and corporation profits tax. The profits of the company would not be subject to excess profits duty after March 30. The past year had shown an improvement in respect of production, deliveries and profits, as compared with any year since the outbreak of war. The difficulties attendant upon manufacturing operations and the distribution of their products continued throughout the period, although they gradually became less acute as the year progressed. The directors announce a dividend of 10 per cent. on the ordinary shares for year to December 31 last.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
St. John, New Brunswick	Drugs. Replies to the Office of the High Commissioner for Canada, 19, Victoria Street, London, S.W.1.	—
New Brunswick	Pulpwood	—
Sofia ...	Creosote; chloride of zinc. Replies to the Department of Overseas Trade, 35, Old Queen Street, Westminster, London, S.W.1.	—
Algiers ...	Chemical products; leather ...	441
Buenos Aires..	Paints; varnishes...	446
Argentine ...	Chemical products	447
Buenos Aires..	Rubber goods	449
Naples ...	Agricultural chemicals; fertilisers; soap; dyes.	473
Malaga ...	Chemical and pharmaceutical products.	476
Toronto ...	Pharmaceutical products ...	468
Montreal ...	Drugs	458

Tariff Changes

MALTA.—The exportation of explosives other than industrial explosives is prohibited.

BELGIUM.—The exportation of the following goods is no longer subject to licence:—Demijohns and cylinders for compressed and liquefied gases; carbonate of soda, crystallised and calcined; phosphate manures (superphosphates); products from the distillation of coal; and residues of burnt iron pyrites. Export licences, which will be granted only in exceptional cases, are still required for the following (with the exception of potash salts, they will be exportable without licence from June 1):—Sulphate and nitrate of ammonia; nitrate of soda; nitrate of lime; cyanamide; dephosphorisation slag; crude potash salts; chloride and sulphate of potash; and compound manures. The importation of sulphuric ether from any country, and of aniline colouring materials from Germany remains subject to licence.

NETHERLANDS.—The prohibition on the export of fertilisers containing phosphoric acid; and zinc ore and oxide of zinc has been withdrawn. The following increased import duties (all in florins per kilogram) are notified:—Chloral hydrate, 7·10; sulphuric ether, 12; acetic ether, 6·70; collodion, 10·60; and chloroform, spirit of nitrous ether, and all other similar substances prepared from or with alcohol, 8·35.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnerships Dissolved

THOMAS, W., and THOMAS, J., carrying on business as metal workers at Bromley, Pensnett, Stafford, under the style of the Bromley Hall Metal Crafts Co., by mutual consent as and from March 16. All debts will be received and paid by W. Thomas.

WELLS, J., and SKEELS, H., glass merchants, at Olivia Drive, Leigh-on-Sea, Essex, under the style of Wells and Skeels, by mutual consent as and from March 23. All debts will be received and paid by H. Skeels, who will continue to carry on the business under the style of H. Skeels.

Order Made on Application for Discharge

DAVIS, H. J., 58, White Hart Lane, Barnes, Surrey, oil and colourman. Court, Wandsworth. Date of order, March 7, 1921. Nature of Order made: Discharge granted subject to the Bankrupt consenting to judgment being signed against him for £10 by the Official Receiver. (*Note.*—£10 has been paid to the Official Receiver.)

Company Winding Up

TYNE CHEMICAL PRODUCTS, LTD.—A petition for winding up by the County Court of Northumberland, Newcastle-on-Tyne, was on April 7, 1921, presented to the Court by Edward Redhead, Elswick Road, Newcastle-on-Tyne, launderer, and will be heard before the Court sitting at the Court House, Westgate Road, Newcastle-on-Tyne, on April 21, 1921, at 10 a.m. H. Benson, Prudential Buildings, Newcastle-on-Tyne, Solicitor to Edward Redhead. *Note.*—Any person who intends to appear on the hearing of the petition must notify the above-named, not later than 6 p.m. on April 20, 1921.

Companies Winding Up Voluntarily

ABBOTT GLASS CO., LTD.—A meeting of creditors will be held at the offices of Messrs. Fincham, Partridge & Co., 3, Warwick Court, Gray's Inn, London, W.C., on Tuesday, April 19, at 2.30 p.m. R. F. W. Fincham, Liquidator.

LEEDS PHOSPHATE WORKS, LTD. (in liquidation for the purposes of reconstruction).—Creditors' claims on or before May 21, to the Liquidator, G. Bennett Nancarrow, Royal Exchange, Middlesbrough.

HERTS BENZOL CO., LTD. (in voluntary liquidation).—A meeting of creditors will be held at Gresham College, Basinghall Street, London, E.C. 2, at 11 a.m., on Monday, April 18. Creditors' claims on or before May 31, to H. H. Bobart, Liquidator, at the above address.

Liquidator's Notice

DISTIL MINUFACTURING CO., LTD.—A meeting of creditors will be held at the Institute of Chartered Accountants, Moorgate Court, Moorgate Street, London, on Tuesday, April 19, at 3 p.m. E. Hart, Liquidator.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

MANN & COOK (WEST AFRICA), LTD., London, E.C.—Reg. March 24, mortgages, to the Colonial Bank, securing all moneys due or to become due to the Bank; charged, on premises in Oxford Street and Howe Street, Freetown, Sierra Leone. *——. January 4, 1921.

NECHELLS METAL CO., LTD., Birmingham.—Reg. March 29, mortgages to London Joint City & Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on premises at Birmingham and all fixtures, machinery, &c. *Nil. January 22, 1920.

PARRY PURE DRUG CO., LTD., Wandsworth, S.W.—Reg. April 5, £500 debentures to H. M. Bradbury, Abu Klea, Branksome Park, Bournemouth; general charge. *Nil. January 23, 1920.

SUN FUEL CO., LTD., London, E.C.—Reg. March 29, £12,600 debentures, to Cox & Co.; general charge *Nil. January 14, 1921.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

NOBLES DRUG STORES, LTD., 2, Well Street, Cable Street, London, E., chemists, £23 11s. 5d. March 3.

GALT, T. J., 25, Railway Road, King's Lynn, chemist, £32 4s. 7d. February 25.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117 Chancery Lane, London, W.C.2:—

GARBUTT & LOWE, LIMITED, 326 High Street, Jarrow-on-Tyne, Durham. Chemists and druggists, &c. Nominal capital £5,000 in 5,000 shares of £1 each. Directors, C. H. Garbutt, E. G. Lowe. Qualification of directors, 1,000 shares.

GREENFIELD BLEACHING COMPANY, LIMITED, 4, Norfolk Street, Manchester. Bleachers and dyers. Nominal capital £100 in 100 shares of £1 each. Directors, H. Allen, A. K. Daires, T. Warburton, F. Whowell. Qualification of directors, one share.

INDUSTRIAL & MARINE PAINTS, LIMITED, 318, Goswell Road, E.C. Paint and varnish manufacturers. Nominal capital £1,000 in 1,000 shares of £1 each. Directors, H. Montague, J. Sackett. Qualification of directors, one share. Remuneration of directors, £1 1s. each meeting.

NAYLOR (RICHARD), LIMITED, 35, Brown Street, Manchester. Chemical and general merchants. Nominal capital £3,000 in 3,000 shares of £1 each. Directors, R. Naylor (managing director), H. B. Naylor. Remuneration of directors, managing director £520.

NEWTON (A. E.), LIMITED. Producers and refiners of petroleum, petroleum products, &c. Nominal capital £50,000 in 50,000 shares of £1 each. Directors to be appointed by subscribers. Qualification of directors, £100. Remuneration of directors to be voted by company in general meeting. Subscribers, H. M. Orgais, A. E. Gardner.

WELDING COMPANY (A. & E.), LIMITED, 7, Bank Street, Ashford, Kent. Oxy-acetylene and general metal welder, &c. Nominal capital £2,000 in 400 shares of £5 each. Directors, E. C. Coke (managing director), A. C. Crothell, F. G. Hayward, J. Kingsford. Qualification of directors, £50.

Benn Brothers Social Circle

ANOTHER enjoyable evening was spent at the Eustace Miles Restaurant, Chandos Street, London, on Friday, under the auspices of the Benn Brothers Social Circle, the company numbering between seventy and eighty members of the staff, including several of the directors. The first part of the programme consisted of a series of impromptu speakers on subjects drawn from a hat. Musical and elocutionary numbers, with a conjuring entertainment, followed, all provided from inside the house, with Mr. A. C. Slaughter as accompanist.